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ABSTRACT

This guide contains materials designed to assist teachers and students in home economics related courses with mastery of job-related mathematics, science, and behavioral science. The 40 Power Pacs are divided into mathematics (16 Power Pacs), science (15), and behavioral science (9). Each Power Pac contains teacher materials and student materials. Each one begins with an information sheet to refresh the teacher's knowledge about the concept. A lesson plan for related class time briefly outlines objectives, teaching aids, steps to prepare the learner for the topic, suggested class presentation with activities and introductory experiments, assignments to provide application experiences, information sheets for students, skill builders (worksheets) and answers, and a sample evaluation. Lessons have no timeframe and may require one day or one week to cover. The table of contents also categorizes Power Pacs by home economics related occupations: child care service, community/home service, fabric service, and food service. Representative topics of Power Pacs include computing yardage (of fabric), measuring liquids, altering recipes, making change, controlling contamination, leavening, maintaining sanitary conditions, safety, nutrition, effective communication, listening, positive reinforcement in the preschool, safety in the preschool, and psychology in patient care. (YLB)

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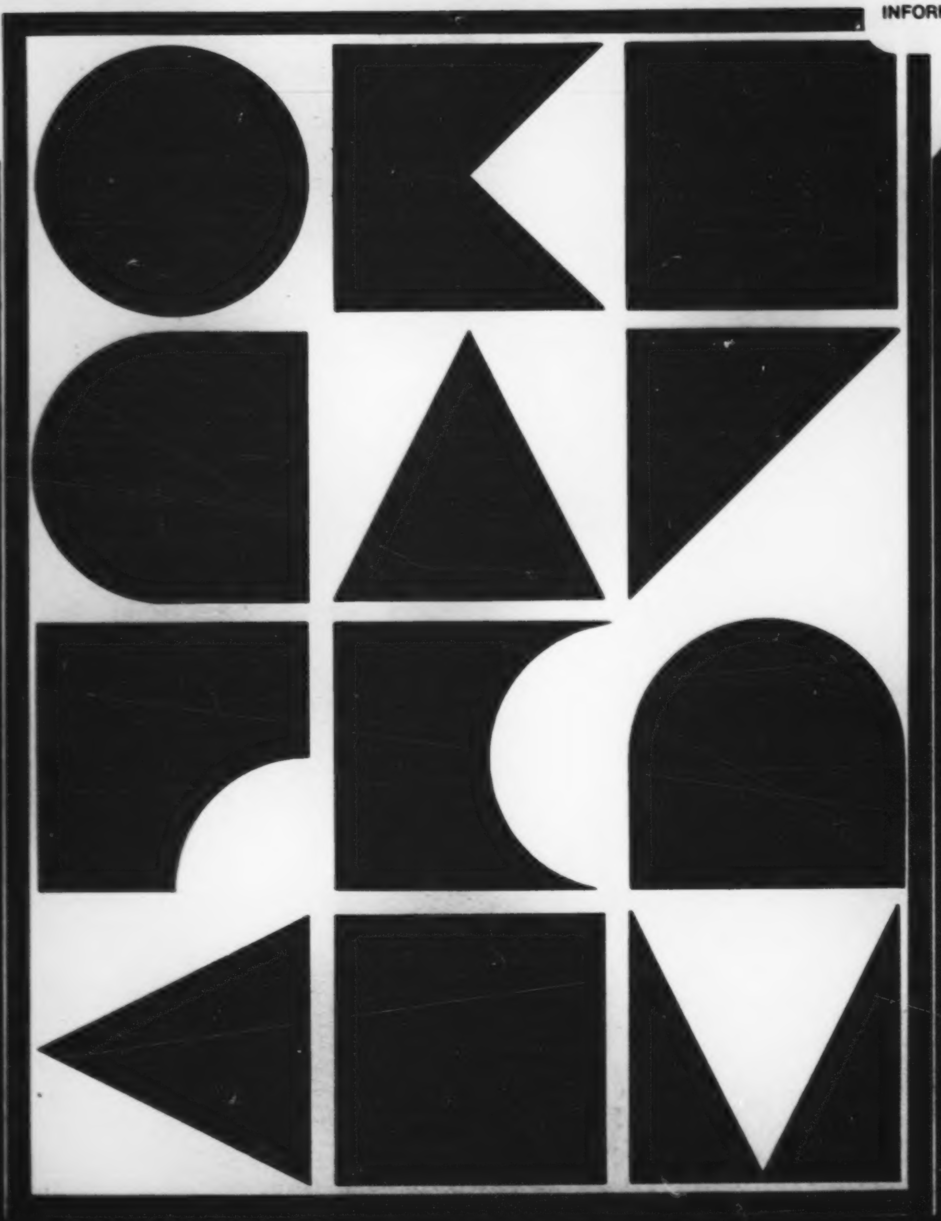
Power Pacs



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1983

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POWER PACS

FOR TEACHING

HOME ECONOMICS RELATED SCIENCE AND MATH

FOREWORD

Although Ohio feels it does not need to take a back seat to other states in regard to "Excellence in Education," there is no room for complacency; improvement still is needed in our education system.

Almost 42 percent of Ohio's juniors and seniors are enrolled in job training programs. To quote the Superintendent of Public Instruction, "These programs equip vocational students with the skills that are needed for immediate employment and are *broad* enough to enable students to adapt to a changing job market." The technical skills for jobs and careers desired by the students are essential learnings; however, the related information that helps the students with the broad concepts that expand their job market potential is equally important.

The mathematic, science, and behavioral science principles essential to the efficient use of job-related technical skills often need extra emphasis to enhance knowledge and understanding vital to the world of work or to broaden educational goals. This guide is designed to assist teachers and students in the related classes with the mastery of math, science, and behavioral science. It should help them adapt learnings to both broad and specific areas within a changing job market.

This is another resource to help enhance "Excellence in Education" for our students in Ohio.

Barbara Reed
Supervisor in Charge
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Home Economics Section

ACKNOWLEDGMENTS

Curriculum development in Ohio is synonymous with teacher contribution. All of the job training guides written since 1969 have represented the knowledge and teaching ability of competent high school instructors. The major professional interest of those who have contributed over the past several years is expressed in the sharing of workable methods, ideas, and systems with fellow teachers of home economics related occupations.

Eleven teachers join with those who have written before. Their selection was based upon successful experience in teaching the occupational area. Our gratitude can never equal their creative effort. The writers and their schools are listed by job training services:

Child Care:	Madge Giedeman, Vanguard Joint Vocational School Arlene Parker, Parma City, Parma High School
Community/Home:	Mary Joy Burkle, Penta County Joint Vocational School Dorothy Sanborn, Trumbull County Joint Vocational School
Fabrics:	Elaine Vrabel, Akron City, North High School Margaret Weber, Canton City, Timken High School
Foods:	Jean Downes, Canton Local, Canton South High School Marian Scarazzo, Montgomery County Joint Vocational School Mary Jane Swank, Lorain County Joint Vocational School
Multi-area:	Charlotte Callihan, Morgan Local, Morgan High School Karen Hansen, Cleveland Heights-University Heights City, Cleveland Heights High School

The teachers were challenged to identify math, science, and behavioral science principles that form a fundamental and continuous part of their programs. The second part of the curriculum writing project was to develop these principles and concepts into an easily used format so that students could master the background information and processes.

The writing workshop was held in Columbus for two weeks during June, 1980, under the auspices of the State of Ohio, Department of Education, Division of Vocational Education, Home Economics Section. Workshop editing activities were organized and coordinated by Kathy Voorhies, state supervisor. Editing and writing of the teacher lesson plan for each package was done by Delores Allenspach, teacher educator, Miami University, now with Carson-Newman College, Tennessee. Roslyn Raver, Home Economics Section, completed the major portion of manuscript typing and proofing, and Thelma Bryant provided additional typing assistance. Sincere appreciation is extended to all participants for sharing their expertise in completing the final guide.

A WORD TO THE TEACHER

TO PROVIDE MEANINGFUL VOCATIONAL EDUCATION

The State Board of Education identified at the opening of the decade thirteen mission statements to achieve in reaching educational excellence in Ohio schools. Providing meaningful vocational education is one of these priorities.

The primary focus of the Vocational Home Economics POWER PACKS is mastery of job related math, science, and vocabulary information. The role of the vocational teacher is to support the acquisition of reading, writing, and mathematical competencies. Given skills in communication, and the knowledge of why and how processes occur, the student should develop a foundation for evaluation and self-correction. Such strength enhances a student's ability to transfer vocational learning to new and changing job options.

HOW THE POWER PACS ARE ORGANIZED

Each POWER PAC is divided into teacher materials and student materials. The major use of the instructional packages is during related class time. The PACS have two sections:

1. Teacher Materials	2. Student Materials
Information Sheet	Assignment Sheet
Sample Lesson Plan	Information Sheet
	Skill Builders

The POWER PACS begin with an information sheet to refresh the teacher's knowledge about the math, science, or behavioral science concept. It is followed by a lesson plan for related class time that briefly outlines objectives, teaching aids, steps to prepare the learner for the topic, suggested class presentation with activities and introductory experiments, assignments to provide application experiences, and a sample evaluation. Lessons have no time frame. Each may require one day or one week to cover. Lesson activities may be expanded to ensure that students fully master an understanding of a concept and can apply it.

The assignment and information sheets and the skill builders of the student materials provide the background information and application activities to support the lesson plan. The skill builders may be completed as part of the vocational laboratory activities. Individuals will require different lengths of time to master the information of a POWER PAC. The teacher can expect to repeat activities and add supplemental ones in helping students reach this goal.

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a bird's eye view

CALCULATE FOOD COSTS

Understand this math concept:

Ratios and proportions

Teacher Materials

Information Sheet
Sample Lesson Plan

Student Materials

Assignment Sheet: Ratios and Proportions
Information Sheets: Costing a Standardized Recipe
Equivalent Weights and Measures for Various Food Products
Skill Builders: Words to Know
Calculating Food Costs

TEACHER INFORMATION SHEET

Understand this math concept:

Ratios and proportions

Costing a standardized recipe means to determine the cost per serving. All recipes used in food service should be pre-costed. The easiest method to figure cost per serving is to use ratios.

Ratio is a way of expressing a comparison. The ratio of 4 c. flour to 1 c. sugar is 4 c. flour to 1 c. sugar. The ratio of 1 c. sugar to 4 c. flour is 1 c. sugar to 4 c. flour.

Proportions are equal ratios. To determine if the proportions are equal, multiply the denominator of each ratio by the numerator of the other ratio.

Examples: $\frac{3}{4} = \frac{6}{8}$ $\quad 6 \times 4 = 3 \times 8$
$\quad 24 = 24$

$\frac{20}{100} = \frac{1}{5}$ $\quad 20 \times 5 = 1 \times 100$
$\quad 100 = 100$

If the products are equal, the proportion is true.

Use Proportions to Determine Unit Costs

Grapefruit 2/25¢ = 6/75¢ $\left(\frac{2}{5} \times 3 = \frac{6}{75}\right)$

4 Apples for 50¢ $\frac{4}{50} = \frac{18}{?}$ $\quad .50 \times 18 \div 4 = \$2.25$

210 Cookies cost $2. How many can you buy if you have $6 to spend?

$\frac{210}{2} = \frac{?}{6}$ $\quad 210 \times 6 \div 2 = 630$ cookies

3 cups of sugar are required to make 2 cakes. How much sugar is required to make 18 cakes?

$\frac{3}{2}$ c. : $\frac{?}{18}$

3 x 18 ÷ 2 = 27 cups

3 pounds of flour costs 89¢. If you spent $2.67 for flour, how many pounds did you buy?

$\frac{3}{89¢} \div \frac{?}{\$2.67}$

$2.67 x 3 ÷ 89 = 9 pounds

Another way of writing proportion or ratio is by using the symbol : between the two sets of numbers. An example is 3 : 9.

SAMPLE LESSON PLAN

Math Concept: Ratios and Proportions
Task: Calculate Food Costs

Objective: The student will be able to:

1. Write a ratio or a proportion.
2. Find equivalent ratios.
3. Calculate food costs.

Teaching Aids:

Chalkboard
Chalk

I. Preparation of the Learner:

The sale price of food is based on food cost, waste control, operating costs and profit. The first step in determining menu pricing is to calculate actual food cost per serving.

II. Presentation:

CONCEPT	CLASSROOM ACTIVITY
Ratios and proportions	Lecture from Teacher Information Sheet.
Calculate food costs	Write the following problems on the chalkboard and show students how to determine unit costs.
	$\frac{10 \text{ oz.}}{\$2.00}$: $\frac{3 \text{ oz.}}{?}$ $3 \times 2.00 \div 10 = .60$
	$\frac{25 \text{ lb.}}{\$6.43}$: $\frac{2 \text{ lb.}}{?}$ $2 \times 6.43 \div 25 = .51$
	$\frac{6 \text{ doz.}}{\$3.25}$: $\frac{2 \text{ doz.}}{?}$ $2 \times 3.25 \div 6 = 1.08$

III. Application:

Have students complete Skill Builders on the assignment sheet individually or in groups.

IV. Evaluation

TEST - DETERMINING RATIOS

Directions:

Complete the following problems.

1. $\frac{1}{2} : \frac{9}{?} =$ ____
2. $\frac{24}{32} : \frac{3}{?} =$ ____
3. $\frac{8}{?} : \frac{48}{54} =$ ____
4. $\frac{40}{64} : \frac{?}{8} =$ ____
5. $\frac{9}{?} : \frac{3}{10} =$ ____
6. $\frac{2}{3} : \frac{36}{?} =$ ____
7. $\frac{8}{?} : \frac{2}{5} =$ ____
8. $\frac{6}{?} : \frac{1}{7} =$ ____
9. $\frac{42}{49} : \frac{6}{?} =$ ____

ASSIGNMENT SHEET

Math Concept:	Ratios and Proportions
Task:	Calculating Food Costs

Why learn this?

Food costs change so rapidly it is necessary that the food service worker cost recipes frequently.

Principle Emphasized: Ratios and Proportions

Words to Know:

Denominator
Numerator

Product
Proportion
Ratio

Resources: Information Sheets: Equivalent Weights and Measures for Various Food Products
Costing a Standardized Recipe

---

1. Read the resources
2. Complete Skill Builder - Words to Know
3. Complete Skill Builder - Calculating Food Costs

INFORMATION SHEET

COSTING A STANDARDIZED RECIPE

The selling price of food is partially determined by the food cost per serving. Costing must be accurate and up-to-date. To figure food costs, the price for various units of measure must be determined.

Many times foods are purchased in case units.

Examples: Tomatoes 6-10 qt. cans for $7.74

What would be the cost for 2 cans?

$\frac{6}{\$7.74} : \frac{2}{?}$ $7.74 × 2 ÷ 6 = $2.58

Eggs 45¢ a doz.

What would 2 eggs cost?

$\frac{12}{45¢} : \frac{2}{?}$ 45¢ × 2 ÷ 12 = 7 1/2¢

One Quart of Pickle Relish costs 60¢

What is the cost of 3 cups?

$\frac{4\ c.}{60¢} : \frac{3}{?}$ 60 × 3 ÷ 4 = 45¢

INFORMATION SHEET

EQUIVALENT WEIGHTS AND MEASURES
FOR VARIOUS FOOD PRODUCTS

Equivalent Weights for One Cup of Food Products

1 c. = 5 oz	Flour
1 c. = 4 3/4 oz	Powdered Sugar
1 c. = 8 oz	Shortening
1 c. = 5 1/4 oz	Relish
1 c. = 8 oz	Tomato Puree
1 c. = 8 oz	Sweet Potatoes
1 c. = 5 1/3 oz	Raisins
1 c. = 4 oz	Walnuts
1 c. = 8 oz	Margarine
1 c. = 8 oz	Mushrooms
1 c. = 8 oz	Milk
1 c. = 8 oz	Pie Filling

SKILL BUILDER

WORDS TO KNOW

Directions:

Write a definition for each of the following words. Under each definition, write a sentence using each word.

1. Denominator

2. Numerator

3. Product

4. Proportion

5. Ratio

SKILL BUILDER

CALCULATING FOOD COSTS

Directions: Use the unit price information below to calculate food costs for Problems I-VII.

UNIT PRICES

	Item	Unit Cost
1.	1 case tomatoes 6/#10	7.74
2.	1 case tomato soup 12/#5	8.16
3.	1 case tomato puree 6/#10	7.80
4.	1 case tuna 6/66½ oz	24.64
5.	1 case cheesecake 6/5 lb	17.70
6.	1 case gelatin 12/24 oz	7.44
7.	1 case catsup 200/individual pkts	2.35
8.	1 case frymax 6/5 qt	19.08
9.	1 case whip topping 12/qt	9.60
10.	1 lb. onions	.20
11.	1 lb. ground beef	.77
12.	1 can ham shanks and pieces	6.80
13.	1 can apple pie filling	2.03
14.	10 lb. chocolate chips	13.40
15.	1 doz. eggs	.45
16.	1 qt. pickle relish	.60
17.	10 lb. potatoes	1.49
18.	1 case of salad dressing 4/1 gal	14.09

Directions: Using the information from the chart, compute the cost of the following:

I. FOOD COST

_____ 1. Cost of 1 can of tuna

_____ 2. Cost of 1 lb. cheesecake

_____ 3. Cost of 1 oz of tuna

_____ 4. Cost of 1 box of gelatin

_____ 5. Cost of 1 individual pac' of catsup

_____ 6. Cost of 1 qt of frymax

_____ 7. Cost of 1 qt of whip topping

_____ 8. Cost of 8 oz of chocolate chips

_____ 9. Cost of 3 eggs

_____10. Cost of 1 C pickle relish

_____11. Cost of filling for 1 apple pie (1 can makes 3 pies)

_____12. Cost of 4 oz of ground beef

_____13. Cost of 1/2 lb onions

_____14. Cost of 1 can of tomato soup

_____15. Cost of 1 can of tomatoes

Directions: Using the information from the chart, UNIT PRICES, calculate the recipe and portion costs of the following:

II. Recipe Cost

Sloppy Joe Mix for 50

1. _____ 10# ground beef
2. _____ 2 #10 tomatoes
3. _____ 1 #10 tomato puree
4. _____ 1 #5 tomato soup
5. _____ 3 lb onions
6. _____ Total Cost
7. _____ Cost/Portion

III. Portion Cost

Ham Salad for 50

1. _____ 3 #10 ham shanks and pieces
2. _____ 2 dozen eggs
3. _____ 3 lb onions
4. _____ 1 qt salad dressing
5. _____ 3 C pickle relish
6. _____ Total Cost
7. _____ Cost/Portion

IV. Portion Cost

Tuna Salad for 50

1. _____ 2 can tuna
2. _____ 1 qt salad dressing
3. _____ 2 dozen eggs
4. _____ 4 C pickle relish
5. _____ 1 lb onions
6. _____ Total Cost
7. _____ Cost/Portion

V. Portion Cost

Hamburger Casserole for 50

1. _____ 8 lb ground meat
2. _____ 1 #10 can tomatoes
3. _____ 5 lb potatoes
4. _____ 1-1/2 lb onions
5. _____ Total Cost
6. _____ Cost/Portion

VI. Portion Cost

Dessert for 8

1. _____ 1 lb cheesecake
2. _____ 1/4 can apple pie filling
3. _____ Total Cost
4. _____ Cost/Portion

VII. Portion Cost

Whipped Gelatin for 25

1. _____ 24 oz of gelatin
2. _____ 2 can whipped topping
3. _____ Total Cost
4. _____ Cost/Portion

Directions: Review the equivalent weights given below for 1 cup of various food products. Using this information, calculate and fill in the information that is missing from the chart:

****

EQUIVALENT WEIGHTS FOR 1 CUP OF FOOD PRODUCTS

****

1 C = 5 oz flour
1 C = 4-3/4 oz powdered sugar
1 C = 8 oz shortening
1 C = 5-1/4 oz relish
1 C = 8 oz tomato puree

****

PROBLEM VIII - 1-24

VIII. Directions: Items 1-6 Calculate the extension price for each product.

	Quantity Cases	Pack Size	Description	Unit Price	Extension
1. ___	3	6/5 lb	Soft Roll Mix	13.80	
2. ___	2	2/25 lb	Flour	7.23	
3. ___	4	1/25 lb	Powdered Sugar	7.55	
4. ___	1	1/50 lb	Shortening	31.25	
5. ___	2	4/1 gal	Relish	13.80	
6. ___	1	6/#10	Tomato Puree	11.59	

Directions: Items 7-12 Calculate quantities purchased from the information in the chart.

7. _____ How many pounds of flour were purchased?

8. _____ How many individual boxes of soft roll mix were purchased?

9. _____ How many pounds of powdered sugar were purchased?

10. _____ How many pounds of shortening were purchased?

11. _____ How many jars of relish were purchased?

12. _____ How many cans of tomato puree were purchased?

Directions: Items 13-24 Calculate the cost of items purchased from the information on the chart.

13. _____ One dinner roll (60 rolls per box)

14. _____ One box of soft roll mix

15. _____ One lb flour

16. _____ One C flour

17. _____ One lb powdered sugar

18. _____ One C powdered sugar

19. _____ One lb of shortening

20. _____ One C of shortening

21. _____ One gal of relish

22. _____ One C of relish

23. _____ One can of tomato puree

24. _____ One C of tomato puree

ANSWER KEY--MATH PRACTICE WORKSHEETS
CALCULATE COSTS (Problems I-VII)

I. Food Cost

1. 4.1066
2. .59
3. .061753
4. .62
5. .01175
6. .635
7. .80
8. .67
9. .1125
10. .15
11. .6766
12. .1925
13. .10
14. .68
15. 1.29

II. Recipe Cost

1. 7.70
2. 2.58
3. 1.30
4. .68
5. .60
6. 12.86
7. .2572

III. Portion Cost/Ham Salad

1. 20.40
2. .90
3. .60
4. .88
5. .45
6. 23.23
7. .4646

IV. Portion Cost/Tuna Salad

1. 8.21
2. .88
3. .90
4. .60
5. .20
6. 10.79
7. .2158

V. Portion Cost/ Hamburger Casserole

1. 6.16
2. 1.29
3. .75
4. .30
5. 8.50
6. .170

VI. Portion Cost/Dessert

1. .59
2. .51
3. 1.10
4. .1375

VII. Portion Cost/ Whipped Gelatin

1. .62
2. 1.60
3. 2.22
4. .088

ANSWER KEY--MATH PRACTICE WORKSHEETS

CALCULATE COSTS (Problem VIII)

VIII. Extension Price

1. 41.40
2. 14.46
3. 30.20
4. 31.25
5. 27.60
6. 11.59

Quantities

7. 50
8. 18
9. 100
10. 50
11. 8
12. 6

Costs

13. .038
14. 2.30
15. .1446
16. .0482
17. .302
18. .10
19. .625
20. .3125
21. 3.45
22. .215
23. 1.931
24. .16

a bird's eye view

COMPUTE SALES TAX

Understand this math concept:

Computing percentages using whole or mixed numbers.

Teacher Materials
Information Sheet
Sample Lesson Plan

Student Materials
Assignment Sheet: Compute Sales Tax
Information Sheets: Sales Tax Chart
Menu I
Menu II
Menu III
Skill Builders: Words to Know
Sales Tax

TEACHER INFORMATION SHEET

Understand this math concept:

Computing percentages using whole
or mixed numbers.

Sales tax is usually computed as a percentage of a dollar. For example, sales tax may be 5% or 5¢ on a dollar.

Percentage is a ratio. It compares a number to 100. Percent means hundredth.

$\frac{20}{100} = 20\%$ $\quad \frac{60}{100} = 60\%$ $\quad \frac{1}{100} = 1\%$ $\quad \frac{21}{100} = 21\%$

$\frac{99}{100} = 99\%$ $\quad \frac{3}{100} = 3\%$

Percents are Fractions

$10\% = \frac{10}{100} = \frac{1}{10}$ $\quad 5\% = \frac{5}{100} = \frac{1}{20}$ $\quad 50\% = \frac{50}{100} = \frac{1}{2}$

$60\% = \frac{60}{100} = \frac{6}{10} = \frac{3}{5}$

OR

$\frac{1}{10} = \frac{10}{100} = 10\%$ $\quad \frac{2}{10} = \frac{20}{100} = 20\%$ $\quad \frac{6}{10} = \frac{60}{100} = 60\%$

$\frac{9}{10} = \frac{90}{100} = 90\%$

Not all fractions are written with 100 as the denominator.

$\frac{1}{4} = \frac{25}{100} = 25\%$ $\quad \frac{1}{2} = \frac{50}{100} = 50\%$ $\quad \frac{3}{4} = \frac{75}{100} = 75\%$

Think! Change to hundredths!

$\frac{2}{5} = ?\,\%$ $\quad \frac{2}{5} \times \frac{20}{20} = \frac{40}{100} = 40\%$

$\frac{7}{10} = ?\,\%$ $\quad \frac{7}{10} \times \frac{10}{10} = \frac{70}{100} = 70\%$

$\frac{5}{5} = ?\,\%$ $\quad \frac{5}{5} \times \frac{20}{20} = \frac{100}{100} = 100\%$

Change a Percent to a Fraction

$30\% = \frac{30}{100}$ or $\frac{3}{10}$ $\qquad 72\% = \frac{72}{100}$ or $\frac{18}{25}$

$46\% = \frac{46}{100}$ or $\frac{23}{50}$ $\qquad 64\% = \frac{64}{100}$ or $\frac{16}{25}$

Write a Percent as a Decimal

$.68 = \frac{68}{100} = 68\%$ $\qquad 1.43 = \frac{143}{100} = 143\%$

$.07 = \frac{7}{100} = 7\%$ $\qquad 7.02 = \frac{702}{100} = 702\%$

Finding a Percent of a Whole or Mixed Number

If Sally got 95% of her test questions correct and there were 20 test questions, how many questions did Sally answer correctly? ____________

A fast way to find a percent of a number is to multiply the number times the percent.

95% of 20 →

$$\begin{array}{r} 20 \\ \times\ .95 \\ \hline 100 \\ 180 \\ \hline 19.00 \end{array}$$

(Write as a decimal)

ANSWER IS 19.

21% of 92 →

$$\begin{array}{r} 92 \\ \times\ .21 \\ \hline 92 \\ 184 \\ \hline 1932 \end{array} = \underline{19.32}$$

SAMPLE LESSON PLAN

Math Concept: Percentage of Whole and Mixed Numbers
Task: Compute Sales Tax

Objective: The student will be able to:

1. Change fractions to percents.
2. Compute a percent of a number.

Teaching Aids:

Chalk
Chalkboard
Play Coins
Play Paper Money

I. Preparation of the Learner:

It is often necessary to compute the sales tax when totaling a guest check. To do this you must be able to figure the percentage of a whole or decimal number.

II. Presentation:

CONCEPT	CLASSROOM ACTIVITY
A tax is a charge added to the cost of a service or product. It is used to pay for governmental services individuals could not afford to buy. Sales tax is computed as a percentage or a specific number of pennies per each dollar charged for an item.	Arrange for a speaker knowledgeable about local taxes to share how the sales tax monies are distributed to benefit groups and individuals in the area. Using play coins, have students work in groups to count out the correct amounts for: 100% of $1. 10% of $1. 50% of $1. 5% of $1. Using play coins and paper money in common denominations and a restaurant menu, compute the local sales tax on 10 separate dinners and lunches.

III. Application:

Have students complete Skill Builders on the assignment sheet individually or in groups.

IV. Evaluation

TEST - PERCENTS AND DECIMALS

Directions:

Complete the following problems.

1. 4% of 100 =
2. 14% of 50 =
3. 99% of 200 =
4. 63% of 49 =
5. 79% of 125 =
6. 31% of $20.50 =
7. 4% of $6.25 =
8. 6% of $9.31 =
9. 6.5% of $3.10 =
10. 3.4% of $2.35 =

ASSIGNMENT SHEET

Math Concept: Computing Percentages

Task: Compute Sales Tax

Why learn this?

If your state requires a sales tax on all transactions, it is your responsibility to compute the tax based on percentage of total transaction. For example, if the sales tax is 6%, what would be the tax on $6.24?

Principle Emphasized:

Computing percentages using whole or mixed numbers.

Words to Know:

Decimal
Denominator
Fraction
Hundredth
Mixed number
Percentage

Resources: Information Sheets -
Sales Tax Chart
Menu I
Menu II
Menu III

---

1. Read the resources
2. Complete Skill Builder - Words to Know
3. Complete Skill Builder - Sales Tax

INFORMATION SHEET

SALES TAX CHART

FOR USE ON OR AFTER 11-25-81

OHIO'S BRACKETED TAX COLLECTION SCHEDULE SALES & USE TAX FOR STATE, COUNTY AND OR TRANSIT TAX – TOTAL 5 1/2% TAX LEVY

SALES 15¢ AND UNDER – NO TAX

Each Sale	Tax	Each Sale	Tax
.16 to .18	.01	8.19 to 8.36	.46
.19 to .36	.02	8.37 to 8.54	.47
.37 to .54	.03	8.55 to 8.72	.48
.55 to .72	.04	8.73 to 8.90	.49
.73 to .90	.05	8.91 to 9.09	.50
.91 to 1.09	.06	9.10 to 9.27	.51
1.10 to 1.27	.07	9.28 to 9.46	.52
1.28 to 1.46	.08	9.47 to 9.64	.53
1.47 to 1.64	.09	9.65 to 9.82	.54
1.65 to 1.82	.10	9.83 to 10.00	.55
1.83 to 2.00	.11	10.01 to 10.18	.56
2.01 to 2.18	.12	10.19 to 10.36	.57
2.19 to 2.36	.13	10.37 to 10.54	.58
2.37 to 2.54	.14	10.55 to 10.72	.59
2.55 to 2.72	.15	10.73 to 10.90	.60
2.73 to 2.90	.16	10.91 to 11.09	.61
2.91 to 3.09	.17	11.10 to 11.27	.62
3.10 to 3.27	.18	11.28 to 11.46	.63
3.28 to 3.46	.19	11.47 to 11.64	.64
3.47 to 3.64	.20	11.65 to 11.82	.65
3.65 to 3.82	.21	11.83 to 12.00	.66
3.83 to 4.00	.22	12.01 to 12.18	.67
4.01 to 4.18	.23	12.19 to 12.36	.68
4.19 to 4.36	.24	12.37 to 12.54	.69
4.37 to 4.54	.25	12.55 to 12.72	.70
4.55 to 4.72	.26	12.73 to 12.90	.71
4.73 to 4.90	.27	12.91 to 13.09	.72
4.91 to 5.09	.28	13.10 to 13.27	.73
5.10 to 5.27	.29	13.28 to 13.46	.74
5.28 to 5.46	.30	13.47 to 13.64	.75
5.47 to 5.64	.31	13.65 to 13.82	.76
5.65 to 5.82	.32	13.83 to 14.00	.77
5.83 to 6.00	.33	14.01 to 14.18	.78
6.01 to 6.18	.34	14.19 to 14.36	.79
6.19 to 6.36	.35	14.37 to 14.54	.80
6.37 to 6.54	.36	14.55 to 14.72	.81
6.55 to 6.72	.37	14.73 to 14.90	.82
6.73 to 6.90	.38	14.91 to 15.09	.83
6.91 to 7.09	.39	15.10 to 15.27	.84
7.10 to 7.27	.40	15.28 to 15.46	.85
7.28 to 7.46	.41	15.47 to 15.64	.86
7.47 to 7.64	.42	15.65 to 15.82	.87
7.65 to 7.82	.43	15.83 to 16.00	.88
7.83 to 8.00	.44	16.01 to 16.18	.89
8.01 to 8.18	.45	16.19 to 16.36	.90

INFORMATION SHEET

MENU I

Buon — Appetito

★ *Appetizers* ★

Antipasto	3.75	Italian Salad	1.00	Chef's Salad	2.50

Soup du Jour ... cup .75; bowl 1.00
SERVED WITH CRACKERS

★ *Dinners* ★

SPAGHETTI OR RIGATONI WITH

TOMATO SAUCE	2.75	MEATBALLS	3.50
MEAT SAUCE	3.50	SAUSAGE	3.95
MUSHROOM SAUCE	3.50	MARINARA SAUCE	2.95
CHEESE RAVIOLI	3.50	RAVIOLI W/MEATBALLS	4.25

BAKED SPECIALTIES

LASAGNE	4.50	MANICOTTI	4.25
with MEATBALLS	5.25	with MEATBALLS	4.95

EGGPLANT PARMIGIANA	4.50	VEAL PARMIGIANA	4.50

SERVED WITH SPAGHETTI OR RIGATONI

MEATLESS DISHES (Good For Vegetarians)

EGGPLANT MANICOTTI	4.50	BAKED CHEESE RAVIOLI	3.95

ENTREES

CAVATELLI with MEATBALLS	4.50	GNOCCHI with MEATBALLS	4.50

MEAT DISHES

RIB EYE PIZZAIOLA with Marinara Sauce, side of Spaghetti or Rigatoni	4.50
OPEN FACE RIB EYE on Garlic Bread with French Fries	4.50
HOT or MILD SAUSAGE with Peppers and Mushrooms in Marinara Sauce with side of Spaghetti or Rigatoni	4.50
BRACIOLE with Spaghetti or Rigatoni	4.50

POULTRY DISHES

BREAST of CHICKEN PARMIGIANA with Spaghetti or Rigatoni	5.50
CHICKEN, Italian Style	4.50
CHICKEN CACCIATORE with Spaghetti or Rigatoni	4.50

MILK FED LEG OF VEAL DISHES

VEAL SCALOPPINE with Spaghetti or Rigatoni	6.50
VEAL & MUSHROOMS with Spaghetti or Rigatoni	6.50
VEAL & PEPPERS with Spaghetti or Rigatoni	5.50
VEAL PARMIGIANA with Spaghetti or Rigatoni	6.50

FRESH SLICED VEAL

DELECTABLE FISH DISHES

FRIED SHRIMP with French Fries and Salad	6.50
SHRIMPS MARINARA with Spaghetti or Rigatoni	6.50
SPAGHETTI or LINGUINI with White or Red Clam Sauce	5.50
FRIED FISH PARMIGIANA with Spaghetti or Rigatoni	4.95
FRIED FISH with French Fries and Salad	4.75

DINNERS INCLUDE SALAD AND BREAD & BUTTER

Neapolitan & Sicilian Pizza Our Specialty

★ *Pizza Menu* ★

NEAPOLITAN PIZZA

	[illegible]	[illegible]	[illegible]
ALL CHEESE	2.25	3.25	4.00
PEPPERONI	2.75	4.25	6.00
SAUSAGE	2.75	4.25	6.00
PEPPERS	2.75	4.25	6.00
MUSHROOMS	2.75	4.25	6.00
EXTRA CHEESE	2.75	4.25	6.00
ONION	2.75	4.25	6.00
ANY TWO ITEMS	3.50	5.65	7.00
ANY THREE ITEMS	4.00	6.50	8.00

NEOPOLITAN — By the Slice 60¢
ANY EXTRA ITEM 25¢
SICILIAN PIZZA — By the Tray
CHEESE $8.50 ONE ITEM $1.25 Extra
COMBINATION OF ANY THREE ITEMS $9.00

CALZONE $1.75 SICILIAN — By the Slice 70¢ ANY EXTRA ITEM 25¢

★ *Sandwiches* ★

STEAK with Peppers & Onion	2.25	MEATBALL	1.85
with CHEESE	2.50	SAUSAGE with Peppers and Onions	2.25
HAM	1.75	SALAMI	1.75
HAM & CHEESE	1.85	SALAMI & CHEESE	1.7
EGGPLANT PARMIGIANA	1.85	HOAGIE	1.95
MEATBALL PARMIGIANA	1.85	VEAL PARMIGIANA	1.95
SAUSAGE PARMIGIANA	1.95	SAUSAGE	1.85

PEPPER & EGG	1.70

★ *Side Orders* ★

Garlic Bread	½ loaf	.80
loaf		1.50
French Fries		.75
Meatballs		1.50
Sausage		1.75

★ *Beverages* ★

Coffee	.40
Sanka	.40
Tea	.35
Soft Drinks	
Coke, Root Beer, Sprite, Tab	35-45

★ *For Children Only* ★

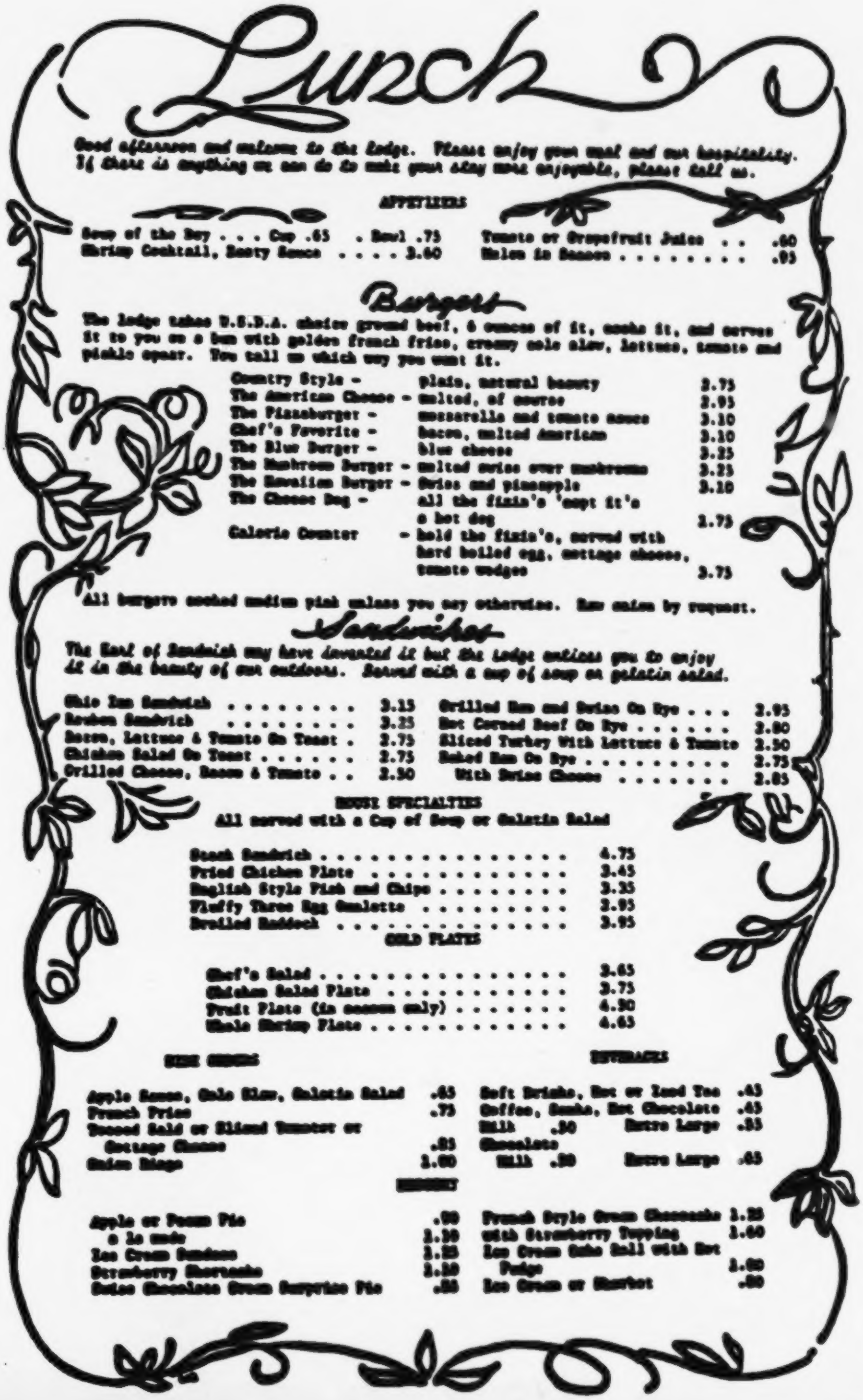
SPAGHETTI with One Meatball	2.25	RIGATONI with One Meatball	2.25
CHICKEN and French Fries	1.95	RAVIOLI with One Meatball	2.25

DINNERS INCLUDE SALAD AND BREAD & BUTTER

★ WE SPECIALIZE IN OUTGOING ORDERS ★
WE DO NOT SPLIT ORDERS

INFORMATION SHEET

MENU II



Lunch

Good afternoon and welcome to the Lodge. Please enjoy your meal and our hospitality. If there is anything we can do to make your stay more enjoyable, please tell us.

APPETIZERS

Soup of the Day . . . Cup .65 . Bowl	.75	Tomato or Grapefruit Juice . .	.60
Shrimp Cocktail, Zesty Sauce	3.60	Melon in Season	.95

Burgers

The Lodge takes U.S.D.A. choice ground beef, 6 ounces of it, cooks it, and serves it to you on a bun with golden french fries, creamy cole slaw, lettuce, tomato and pickle spear. You tell us which way you want it.

Country Style -	plain, natural beauty	2.75
The American Cheese -	melted, of course	2.95
The Pizzaburger -	mozzarella and tomato sauce	3.10
Chef's Favorite -	bacon, melted American	3.10
The Blue Burger -	blue cheese	3.25
The Mushroom Burger -	melted swiss over mushrooms	3.25
The Hawaiian Burger -	Swiss and pineapple	3.10
The Cheese Dog -	all the fixin's 'cept it's a hot dog	2.75
Calorie Counter -	hold the fixin's, served with hard boiled egg, cottage cheese, tomato wedges	3.75

All burgers cooked medium pink unless you say otherwise. Raw onion by request.

Sandwiches

The Earl of Sandwich may have invented it but the Lodge entices you to enjoy it in the beauty of our outdoors. Served with a cup of soup or gelatin salad.

Ohio Inn Sandwich	3.15	Grilled Ham and Swiss On Rye . . .	2.95
Reuben Sandwich	3.25	Hot Corned Beef On Rye	2.80
Bacon, Lettuce & Tomato On Toast .	2.75	Sliced Turkey With Lettuce & Tomato	2.50
Chicken Salad On Toast	2.75	Baked Ham On Rye	2.75
Grilled Cheese, Bacon & Tomato . .	2.50	With Swiss Cheese	2.85

HOUSE SPECIALTIES

All served with a Cup of Soup or Gelatin Salad

Steak Sandwich	4.75
Fried Chicken Plate	3.45
English Style Fish and Chips	3.35
Fluffy Three Egg Omelette	2.95
Broiled Haddock	3.95

COLD PLATES

Chef's Salad	3.65
Chicken Salad Plate	3.75
Fruit Plate (in season only)	4.50
Whole Shrimp Plate	4.65

SIDE ORDERS		BEVERAGES	
Apple Sauce, Cole Slaw, Gelatin Salad	.45	Soft Drinks, Hot or Iced Tea	.45
French Fries	.75	Coffee, Sanka, Hot Chocolate	.45
Tossed Salad or Sliced Tomatoes or		Milk .30 Extra Large	.55
Cottage Cheese	.85	Chocolate	
Onion Rings	1.00	Milk .35 Extra Large	.65

DESSERT

Apple or Pecan Pie	.90	French Style Cream Cheesecake	1.25
a la mode	1.30	with Strawberry Topping	1.60
Ice Cream Sundaes	1.25	Ice Cream Cake Roll with Hot	
Strawberry Shortcake	1.30	Fudge	1.00
Swiss Chocolate Cream Surprise Pie	.85	Ice Cream or Sherbet	.80

BEST COPY AVAILABLE

INFORMATION SHEET

MENU III

WILD CAT ROOM

SPECIAL I

Filet Mignon
Baked Potato w/Sour Cream
Salad Bar
Roll and Butter
Brownie Delight
Beverage
$3.65

SPECIAL II

Country Fried Chicken (2)
Homemade Noodles
Green Peas and Onions
Salad Bar
Hot Bread and Butter
English Trifle
Beverage
$2.80

SANDWICHES

Our Heritage Burger	.75
Double Heritage Burger	1.15
Double Cheeseburger	1.25
Cheeseburger	.80
Colonial Sirloin w/Mushrooms	.90
Cape Cod	.50
The Model BLT	.65

SALADS

Salad Bar	95¢
Tossed Salad	75¢
Cole Slaw	45¢

DESSERTS

Sundae	65¢
Milkshake	65¢
(extra thick)	85¢
Cake	40¢
Pie	50¢
(a la mode)	70¢

BEVERAGES

Soda Pop	25¢
Tea (iced or hot)	25¢
Milk	25¢
Coffee	30¢

SKILL BUILDER

WORDS TO KNOW

Directions:

Define the following words.

1. Hundredths________________________________

2. Fraction________________________________

3. Percentage________________________________

4. Denominator________________________________

5. Decimal________________________________

6. Mixed Number________________________________

SKILL BUILDER

SALES TAX

1. Directions:

Using Menu I and the Sales Tax Chart, compute the total guest check for each of the following.

_____ 1. Antipasto salad, 1/2 loaf of garlic bread, and Tab (large).

_____ 2. Eggplant manicotti and coffee.

_____ 3. Fish, french fries, salad, and Sanka

_____ 4. Chicken cacciatore with spagehetti, loaf garlic bread, and tea.

_____ 5. 12" pizza with double cheese, pepperoni, and sausage.

_____ 6. Meatball sandwich, french fries, and Sprite (large).

_____ 7. Lasagna with meatballs and coffee.

_____ 8. Chicken, french fries (child's portion), and Coke (small).

_____ 9. Two Calzone.

_____10. Four slices sicilian pizza

_____11. Veal scaloppine, rigatoni, and bread and butter

_____12. Ham sandwich and coffee.

_____13. Shrimp marinara, spaghetti and water.

_____14. Baked cheese ravioli and root beer (small).

_____15. Spaghetti with meat sauce.

_____16. Rigatoni and two meatballs (child's portion).

_____17. Sausage, peppers, and onion sandwich.

_____18. 16" cheese pizza.

_____19. 9" pizza with 5 toppings.

_____20. Tray of sicilian pizza with cheese, pepperoni, and mushrooms.

_____21. 12" pizza with sausage.

_____22. Eight Calzone.

II. Directions:

Using Menu II and the Sales Tax Chart, compute the total guest check for each of the following.

_____1. Cup of soup, cheese dog, cole slaw, and milk.

_____2. Apple pie a la mode and coffee.

_____3. Reuben sandwich, french fries, and Coke.

_____4. Calorie Counter and iced tea.

_____5. Chef salad and extra large milk.

_____6. Tomato juice, chicken salad sandwich on toast, and Sanka.

_____7. Baked ham on rye with cheese, french fries.

_____8. Melon and hot tea.

_____9. Steak sandwich, sliced tomatoes, cheesecake.

_____10. Broiled haddock, soup, large chocolate milk.

_____11. Whole shrimp plate and hot chocolate.

_____12. Cottage cheese, swiss chocolate cream surprise pie.

_____13. Pizzaburger, french fries, and cole slaw.

_____14. Cheesecake with strawberry topping.

_____15. Country style and hot tea.

_____16. Fluffy three egg omelette and coffee.

_____17. Fried chicken plate, gelatin salad, 7-Up.

_____18. Corned beef on rye with tossed salad.

_____19. Shrimp cocktail and tea.

_____20. Tomato juice, Ohio Inn sandwich, and Coke.

_____21. Hot fudge sundae and Sanka.

_____22. Fish and chips, pecan pie, soft drink.

_____23. Sliced turkey sandwich, soup, extra large milk.

_____24. Chicken salad plate, iced tea, and swiss pie.

III. Directions:

Using Menu III and the Sales Tax Chart, compute the total guest check for each of the following.

______1. Special I, coffee.

______2. Our Heritage Burger, salad bar, pie and soda pop.

______3. Colonial sirloin, tossed salad, milk.

______4. Cake and milkshake.

______5. Model BLT, cole slaw, pie, coffee.

______6. Sundae and water.

______7. Special II.

______8. Double cheeseburger, salad bar, iced tea.

______9. Cape Cod, sundae, milk.

______10. Double Heritage Burger, soda pop.

______11. Cherry pie a la mode and coffee.

______12. Cheeseburger, tossed salad, milk.

______13. Salad bar, coffee.

______14. Colonial sirloin, milkshake.

______15. Extra thick milkshake.

______16. Tossed salad and soda pop.

______17. Cape Cod, cole slaw, iced tea.

______18. Special II and milk.

______19. Double cheeseburger, cole slaw, milk.

______20. Special I and sundae.

IV. Directions:

Compute the sales tax and total guest check for the following food costs. Write the answers in the correct columns.

FOOD COST	SALES TAX	TOTAL GUEST CHECK
1. $1.75		
2. 4.60		
3. 9.30		
4. 10.50		
5. 5.47		
6. 8.53		
7. 7.46		
8. 9.75		
9. .15		
10. .67		
11. 1.00		
12. 4.30		
13. 3.50		
14. 6.89		
15. 5.59		
16. 10.64		
17. 8.90		
18. 3.47		
19. 2.10		
20. 1.94		

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SKILL BUILDER
ANSWER SHEET

Sales Tax

I. 1. 5.28
2. 5.17
3. 5.44
4. 6.70
5. 6.86
6. 3.01
7. 5.97
8. 2.43
9. 3.70
10. 2.96
11. 6.86
12. 2.27
13. 6.86
14. 4.54
15. 3.70
16. 3.96
17. 2.38
18. 4.22
19. 4.75
20. 9.50
21. 4.49
22. 14.77

II. 1. 3.01
2. 1.64
3. 4.70
4. 4.44
5. 4.44
6. 4.01
7. 3.80
8. 1.48
9. 7.34
10. 4.86
11. 5.39
12. 1.80
13. 3.28
14. 1.69
15. 3.38
16. 3.59
17. 4.12
18. 3.86
19. 4.28
20. 4.44
21. 1.80
22. 4.96
23. 3.22
24. 5.33

III. 1. 3.86
2. 2.59
3. 2.01
4. 1.11
5. 2.01
6. .69
7. 2.96
8. 2.59
9. 1.48
10. 1.48
11. 1.06
12. 1.90
13. 1.32
14. 1.64
15. .90
16. 1.06
17. 1.27
18. 2.96
19. 2.06
20. 4.54

		TAX	TOTAL
IV.	1.	.10	1.85
	2.	.26	4.86
	3.	.52	9.82
	4.	.58	11.08
	5.	.31	5.78
	6.	.47	9.00
	7.	.41	7.87
	8.	.54	10.29
	9.	.01	.16
	10.	.04	.71
	11.	.06	1.00
	12.	.24	4.54
	13.	.20	3.70
	14.	.38	7.27
	15.	.31	5.90
	16.	.59	11.23
	17.	.49	9.39
	18.	.20	3.67
	19.	.12	2.22
	20.	.11	2.05

a bird's eye view

COMPUTING YARDAGE
FOR DRAPERIES AND PLEATED CURTAINS

Understand this math concept:

Multiplying whole numbers by fractions; reducing fractions.

Teacher Materials

Information Sheet
Sample Lesson Plan

Student Materials

Assignment Sheet: Compute Yardage for Draperies and Pleated Curtains
Information Sheet: Determining Cut Length and Width for Draperies
Skill Builders: Words To Know
How Much?
Dig Up the Facts

TEACHER INFORMATION SHEET

Understand this math concept:

Multiplying whole numbers by fractions; reducing fractions.

Finding Fractions of a Yard

2/9 of 36 inches = $\frac{36}{1} \times \frac{2}{9} = \frac{72}{9}$ = 8 inches

2/3 of 36 inches = $\frac{36}{1} \times \frac{2}{3} = \frac{72}{3}$ = 24 inches

1/2 of 36 inches = $\frac{36}{1} \times \frac{1}{2} = \frac{36}{2}$ = 18 inches

5/6 of 36 inches = $\frac{36}{1} \times \frac{5}{6} = \frac{180}{6}$ = 30 inches

3/4 of 36 inches = $\frac{36}{1} \times \frac{3}{4} = \frac{108}{4}$ = 27 inches

1/8 of 36 inches = $\frac{36}{1} \times \frac{1}{8} = \frac{36}{8}$ = 4 1/2 inches

3/8 of 36 inches = $\frac{36}{1} \times \frac{3}{8} = \frac{108}{8}$ = 13 1/2 inches

Reducing Fractions

You can divide both numerator and denominator of a fraction by a common factor to get an equivalent fraction.

$\frac{2}{4} \div 2 = \frac{1}{2}$ $\frac{6}{9} \div 3 = \frac{2}{3}$

$\frac{8}{12} \div 2 = \frac{4}{6}$ OR $\frac{8}{12} \div 4 = \frac{2}{3}$

Reduce These Fractions

a. $\frac{4}{6}$ = ______

b. $\frac{3}{24}$ = ______

c. $\frac{6}{8}$ = ______

d. $\frac{9}{12}$ = ______

e. $\frac{15}{20}$ = ______

f. $\frac{12}{18}$ = ______

g. $\frac{4}{10}$ = ______

h. $\frac{5}{15}$ = ______

i. $\frac{8}{12}$ = ______

j. $\frac{4}{6}$ = ______

SAMPLE LESSON PLAN

Math Concept: Multiplication and Reduction of Fractions
Task: Computing Yardage for Draperies and Pleated Curtains

Objective: The student will be able to:

1. Multiply whole numbers with fractions.
2. Reduce fractions.
3. Accurately figure the yardage needed for draperies and pleated curtains.

Teaching Aids:

Chalkboard
Chalk
Yardstick
Drapery panel

I. Preparation of the Learner:

If you had to measure 3/8 of a yard of drapery fabric, how much would that be?

II. Presentation:

CONCEPT	CLASSROOM ACTIVITIES
Multiplying whole numbers and fractions	Chalkboard talk: (Use Teacher Information Sheet)
Reducing fractions	Chalkboard talk: (Use Teacher Information Sheet)
Yardage needed for draperies	Demonstration on Measuring: (Use Student Information Sheet)

III. Application:

Have the students complete Skill Builders on Student Assignment Sheet individually.

IV. Evaluation

MULTIPLYING AND REDUCING FRACTIONS

How many inches is:

1. 1/4 of a yard? ________
2. 3/8 of a yard? ________
3. 2/3 of a yard? ________
4. 7/8 of a yard? ________
5. 3/4 of a yard? ________

Reduce these fractions:

6. 6/8 = ________
7. 3/9 = ________
8. 4/12 = ________
9. 9/18 = ________
10. 12/24 = ________

ASSIGNMENT SHEET

Math Concept: Multiplication and Reduction of Fractions

Task: Compute Yardage for Draperies and Pleated Curtains

Why learn this:

Drapery fabric is very expensive. A customer will want to know the total cost of fabric, hardware, and labor. It is important that you be able to determine fabric needs for each job.

Principle Emphasized:

Multiplying whole numbers by fractions; reducing fractions.

Words to Know:

Cut Length
Cut Width
Widths
Crinoline
Heading
Panel

Finished Length
Finished Width
Selvage
Return
Overlap

Resources: Information Sheet - Computing Yardage for Draperies and Pleated Curtains

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1. Read the Information Sheet
2. Complete Skill Builder #1 - Words to Know
3. Complete Skill Builder #2 - How Much?
4. Complete Skill Builder #3 - Dig Up The Facts

INFORMATION SHEET

DETERMINE CUT LENGTH

FOR DRAPERIES AND PLEATED CURTAINS

Length

Formula -- ________ finished length + ______ hem + ______ crinoline heading = the cut length.

a. Draperies have double three, double four, or double five inch hems.

b. Double the crinoline width plus one inch for ravel.

1. For three inch wide crinoline, add 7 for heading.
2. For three and one half inch crinoline, add 8 for heading.
3. For four inch wide crinoline, add 9 for heading.

Example:

Finished Length	84 inches
Double four inch hem	
Four inch wide crinoline	

84 + 8 + 9 = 101 inches cut length

Problems

1. The finished length is 45 inches. The draperies will have a double four inch hem and four inch wide crinoline. What is the cut length?

2. The finished length is 75 inches. The draperies will have a double five inch hem and four inch wide crinoline. What is the cut length?

Width

The width of the material is always the cut width. Most common widths for drapery fabrics are 48 inches and 54 inches. Sheers fabrics come in a variety of widths from 48 inches to 144 inches.

Example:

The drapery fabric is 48 inches wide. The cut width is 48 inches.

Problems

3. The drapery fabric is 54 inches wide.

What is the cut width? ________

Formula -- ________ finished width + ________ side hems and seams x (times) 2 (for double fullness) ________ divided by the width of the material = ________ the number of widths needed. Round your answer to the nearest whole number.

Example:

Allow six inches for side hems and seams. The cut width is 48 inches.

Finished Width 54 inches

$54 + 6 = 60 \times 2 = 120$

Material Width 45 inches wide

$$\begin{array}{r} 2 \\ 45\overline{)120} \\ \underline{90} \\ 30 \end{array}$$

What is the cut width? 45 inches

How many widths are needed? 3

30 is more than half of 45, round off the answer to 3.

Problems

4. The finished width is 47. The material is 36 inches wide.

What is the cut width? ________

How many widths are needed? ________

Problems

5. The finished width is 92. The material is 48 inches wide.

What is the cut width? ________

How many widths are needed? ________

Yardage Needed

Formula -- Multiply the cut length by the widths needed -- then divide by 36 (for there are 36 inches in a yard). BE ACCURATE. Convert remainder to the nearest eighth of a yard equal to or more than amount needed.

Note: 1/8 = 4 1/2 inches

2/8 or 1/4 = 9 inches

3/8 = 13 1/2 inches

4/8 or 1/2 = 18 inches

5/8 = 22 1/2 inches

6/8 or 3/4 = 27 inches

7/8 = 31 1/2 inches

1 = 36 inches

Example:

Cut Length 101 101 × 3 = 303

Widths Needed 3

$$\begin{array}{r} 8 \\ 36\overline{)303} \\ \underline{288} \\ 15 \end{array}$$

requires 1/2

How many yards of Fabric are needed? 8 1/2 yards

Problems

6. The cut length is 45. There are two widths needed.

How many yards of fabric are needed? ________

SKILL BUILDER

WORDS TO KNOW

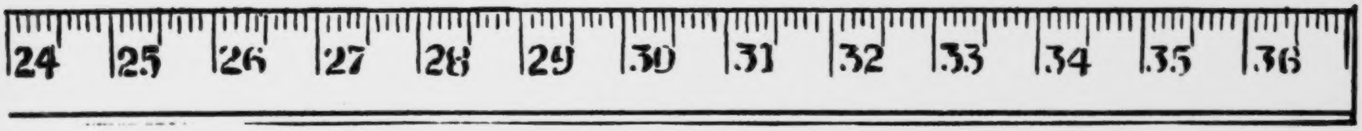
Cut Length
Widths
Crinoline
Heading
Panel
Overlap
Cut Width
Finished Length
Finished Width
Selvage
Return

Directions:

Sketch a drapery panel before construction and a traverse rod. Label parts with these terms.

SKILL BUILDER

HOW MUCH



1. Write the formula for determining cut length.

   a. The finished length is 64 inches. The draperies will have a double five inch hem and a four inch wide crinoline.

   What is the cut length? ______

   b. The finished length is 16 inches. The drapery will have a double three inch hem and a three inch wide crinoline.

   What is the cut length? ______

2. List the most common widths for drapery fabrics:

   Write the formula for determining cut width.

   a. The drapery fabric is 54 inches.

   What is the cut width: ______

3. Write the formula for determining widths needed.

   How many inches are allowed for hems and seams? ______

   a. Finished width is 60 inches, material width is 48 inches.

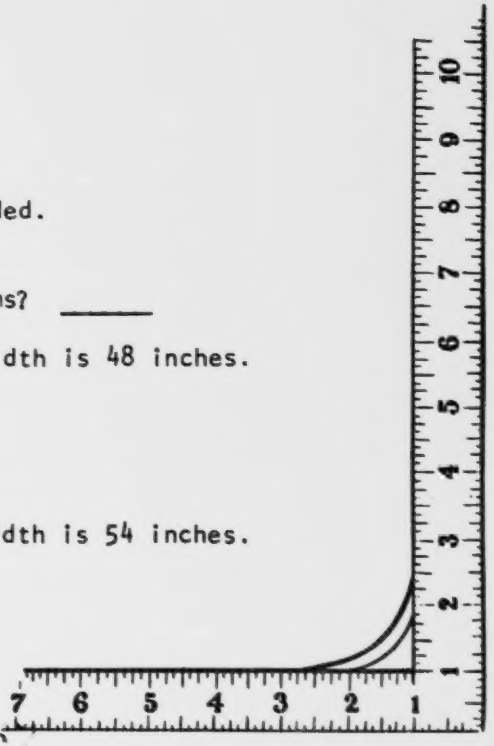
   What is the cut width? ______

   How many widths are needed? ______

   b. Finished width is 96 inches, material width is 54 inches.

   What is the cut width? ______

   How many widths are needed? ______



c. Finished width is 40 inches, material width is 48 inches.

What is the cut width? ______

How many widths are needed? ______

4. Complete the chart:

a. 1/8 yard = ________ inches.

b. 2/8 or 1/4 yard = ________ inches.

c. 3/8 yard = ________ inches.

d. 4/8 yard or 2/4 yard or 1/2 yard = ________ inches.

e. 5/8 yard = ________ inches.

f. 6/8 yard or 3/4 yard = ________ inches.

g. 7/8 yard = ________ inches.

h. 1 yard = ________ inches.

5. Write the formula for determining the amount of yardage needed.

a. Cut length is 46 inches and two widths are needed.

How many yards of fabric are needed?________

B. Cut length is 98 inches and four widths are needed.

How many yards of fabric are needed?________

6. Using all formulas, compute the following:

a. Finished Length 36
Finished Width 24
Fabric Width 48
Hem - Double Four
Crinoline - 3 1/2 inches

What is the cut length? ________

What is the cut width? ________

How many widths are needed? ________

How many yards of fabric are needed? ________

b. Finished Length 84
Finished Width 58
Fabric Width 48
Hem - Double Five
Crinoline - 4 inches

What is the cut length? ________

What is the cut width? ________

How many widths are needed? ________

How many yards of fabric are needed? ________

SKILL BUILDER

DIG UP THE FACTS

Problem 1

Width 36
Length 54
Double four inch hem
4 inch crinoline
45 inch wide fabric

What is the cut length? ________

What is the cut width? ________

How many widths are needed? ________

How many yards of fabric are needed? ________

Problem 2

Width 95
Length 81
Double five inch hem
54 inch wide fabric
4 inch crinoline

What is the cut length? ________

What is the cut width? ________

How many widths are needed? ________

How many yards of fabric are needed? ________

Problem 3

Width 50
Length 72
3 inch crinoline
Double four inch hem
36 inch wide fabric

What is the cut length? ________

What is the cut width? ________

How many widths are needed? ________

How many yards of fabric are needed? ________

Problem 4

Width 45
Length 68
Double three inch hem
3 1/2 inch crinoline
45 inch wide fabric

What is the cut length? ________

What is the cut width? ________

How many widths are needed? ________

How many yards of fabric are needed? ________

INFORMATION SHEET

ANSWER SHEET

PROBLEMS

1.	62 inches	Finished length	45
		Hem - Double 4 inches	8
		Crinoline - 4 inches	8
		plus 1 inch for ravel	1
		Cut Length	62 inches

2.	94 inches	Finished length	75
		Double - Double 5 inches	10
		Crinoline - 4 inches	8
		plus 1 inch for ravel	1
		Cut Length	94 inches

3. 54 inches The cut width can only be as wide as the fabric.

4.	Cut Width 36	Finished width	47
		Side hems and seam allowance	+6
	3 Widths Needed		53
		Double Fullness	x2
		Needed Width	106 inches

Cut Width
36

$$\begin{array}{r} 2 \\ 36\overline{)106} \\ \underline{72} \\ 34 \end{array}$$

34 is more than half of 36.
Round off the answer to 3.

5.	Cut Width 48	Finished width	92
		Side hems and seam allowance	+6
			98
	4 Widths Needed	Double Fullness	x2
		Needed Width	196 inches

Cut Width
48

$$\begin{array}{r} 4 \\ 48\overline{)196} \\ \underline{192} \\ 4 \end{array}$$

4 is less than half of 48.
Round off the answer to 4.

Problems

6. 2 1/2 yards

Cut Length 45
Widths Needed x2
90 inches

$$\begin{array}{ll} \text{Cut Length} & 45 \\ \text{Widths Needed} & \underline{\times 2} \\ & 90 \text{ inches} \end{array}$$

36 inches in yard

$$\begin{array}{r} 2 \\ 36\overline{)90} \\ \underline{72} \\ 18 \end{array} = 4/8 \text{ OR } 1/2 \text{ yard}$$

SKILL BUILDER

ANSWER SHEET

HOW MUCH

Problem 1

a. 83 inches

Finished length	64
Hem - Double 5 inches	10
Crinoline - 4 inches	8
plus 1 inch for ravel	1
	83 inches

b. 29 inches

Finished length	16
Hem - Double 3 inches	6
Crinoline - 3 inches	6
plus 1 inch for ravel	1
	29 inches

Problem 2

48 inches and 54 inches are the most common widths for drapery fabrics.

Formula for Cut Width: The width of the material is always the cut width.

a. 54 inches

Problem 3

Formula for determining widths needed:

Finished width plus side hems and seams times 2 (for double fullness) divided by the width of the material equals the number of widths needed.

Draperies have double three, double four, or double five inch hems.

a. 48 inches

3 Widths Needed

Finished width	60
Side hems and seam allowance	+6
	66
For Double Fullness	x2
Needed width	132

Cut Width
$$\begin{array}{r} 2 \\ 48\overline{)132} \\ \underline{96} \\ 36 \end{array}$$

36 inches is more than half of 48.
Round off the answer to 3.

Problem 3

b. 54 inches

4 Widths Needed

Finished width	96
Side hems and seam allowance	+6
	102
Double Fullness	x2
Needed Width	204

Cut Width $\begin{array}{r} 3 \\ 54\overline{)204} \\ \underline{162} \\ 42 \end{array}$

42 inches is more than half of 54. Round off the answer to 4.

c. 48 inches

2 Widths Needed

Finished width	40
Side hems and seam allowance	+6
	46
Double Fullness	x2
Needed Width	92

Cut Width $\begin{array}{r} 1 \\ 48\overline{)92} \\ \underline{48} \\ 44 \end{array}$

44 inches is more than half of 48. Round off the answer to 2.

Problem 4

a. 4 1/2 inches
b. 9 inches
c. 13 1/2 inches
d. 18 inches
e. 22 1/2 inches
f. 27 inches
g. 31 1/2 inches
h. 36 inches

Problem 5

Formula for determining the amount of yardage needed.

Multiply the cut length by the widths needed -- then divide by 36. Convert remainder to the nearest eighth of a yard equal to or more than amount needed.

a. 2 5/8 yards

Cut Length	46
Needed Widths	x2
	92

Inches in a yard $\begin{array}{r} 2 \\ 36\overline{)92} \\ \underline{72} \\ 20 \end{array}$ inches = 5/9 yard -- converted to the nearest eighth of yard = 5/8.

Problem 5

b. 11 yards

Cut Length
$$\begin{array}{r} 98 \\ \times 4 \\ \hline 392 \end{array}$$

Inches in a yard
$$\begin{array}{r} 10 \\ 36\overline{)392} \\ \underline{36} \\ 32 \end{array}$$

32 inches converted to the nearest eighth equals 1 yard

Problem 6

a.

Cut length	52
Cut width	48
Widths needed	1 1/2
Yardage needed	2 7/8

Finished length	36
Hem - Double 4 inches	8
Crinoline- 3 1/2 inches	7
plus 1 inch for ravel	1
Cut Length	52

Finished width	24
Side hems and seam allowance	6
	30
Double Fullness	x2
Needed Width	60

$$\begin{array}{r} 1 \\ 36\overline{)52} \\ \underline{36} \\ 16 \end{array}$$

16 inches converted to the nearest eighth equals 1 yard

Cut width
$$\begin{array}{r} 1 \\ 48\overline{)60} \\ \underline{48} \\ 12 \end{array}$$

12 is less than half of 48

b.

Cut length	103
Cut width	48
Widths needed	3
Yardage needed	8 5/8

Finished length	84
Hem - Double 5 inches	10
Crinoline- 4 inches	8
plus 1 inch for ravel	1
Cut Length	103
Widths Needed	x3
Inches Needed	309

Finished width	58
Side hems and seam allowance	6
	64
Double Fullness	x2
Needed Width	128

$$\begin{array}{r} 8 \\ 36\overline{)309} \\ \underline{288} \\ 21 \end{array}$$

21 = 5/8 yard

Cut width
$$\begin{array}{r} 2 \\ 48\overline{)128} \\ \underline{96} \\ 32 \end{array}$$

32 is more than half of 48. Round off the answer to 3.

SKILL BUILDER

ANSWER SHEET

DIG UP THE FACTS

Problem 1

Cut Length	71		54	36	1	71	
Cut Width	45		8	+6	45/84	x2	3
Widths Needed	2		8	42	45	142	36/142
Yards Needed	4		1	x2	39		108
			71	84			34

32 = 1 yard

Problem 2

Cut Length	100		81	95	3	100	11
Cut Width	54		10	+6	54/202	x4	36/400
Widths Needed	4		8	101	162	400	36
Yards Needed	11	1/4	1	x2	40		40
			100	202			36
							4

4 = 1/4 yard

Problem 3

Cut Length	87		72	50	3	87	7
Cut Width	36		8	+6	36/112	x3	36/261
Widths Needed	3		6	56	108	261	252
Yards Needed	7	1/4	1	x2	4		9
			87	112			

9 = 1/4 yard

Problem 4

Cut Length	82		68	45	2	82	4
Cut Width	45		6	+6	45/102	x2	36/164
Widths Needed	2		7	51	90	164	144
Yards Needed	6	7/8	1	x2	12		20
			82	102			

20 = 5/8 yard

a bird's eye view

COMPUTING YARDAGE FOR PATTERN PIECES

Understand this math concept:

Converting inches to yards.

Teacher Materials
Information Sheet
Sample Lesson Plan

Student Materials
Assignment Sheet: Compute Yardage for Pattern Pieces
Information Sheet: Determining Required Yardage for Pattern Pieces
Skill Builders: Words to Know
Conversions

TEACHER INFORMATION SHEET

Understand this math concept:

Converting inches to yards.

Convert Inches to Yards

When all pattern pieces have been placed on a fabric, the total number of inches can be calculated. To change this number to yards, divide by 36. (Because there are 36 inches in a yard.) Convert the remaining inches to the nearest eighth of a yard. It should be equal to, or more than, the amount needed. BE ACCURATE! Note the following equivalents.

Yard =	Inches	Yard =	Inches
1/8	4 1/2	5/8	22 1/2
2/8 (or 1/4)	9	6/8 (or 3/4)	27
3/8	13 1/2	7/8	31 1/2
4/8 (or 1/2)	18	1	36

EXAMPLE

The total number of inches needed is 75. How many yards is this?

	2	Yards
Inches in 1 yard = 36)	75	Total inches needed
	72	
	3	Inches remaining; requires 1/8 yard
		ANSWER: 2 1/8 yards

EXAMPLE

The total number of inches needed is 149. How many yards is this?

	4	Yards
Inches in 1 yard = 36)	149	Total inches needed
	144	
	5	Inches remaining; requires 1/4 yard
		ANSWER: 4 1/4 yards

Convert Inches to a Fraction of a Yard (36 Inches)

$\frac{3 \text{ inches}}{36 \text{ inches}} = 1/12$ yard

$\frac{18 \text{ inches}}{36 \text{ inches}} = 1/2$ yard

$\frac{9 \text{ inches}}{36 \text{ inches}} = 1/4$ yard

$\frac{6 \text{ inches}}{36 \text{ inches}} = 1/6$ yard

$\frac{12 \text{ inches}}{36 \text{ inches}} = 1/3$ yard

$\frac{24 \text{ inches}}{36 \text{ inches}} = 2/3$ yard

SAMPLE LESSON PLAN

Math Concept: Converting Inches to Yards
Task: Compute Yardage for Pattern Pieces

Objective: The student will be able to:

1. Convert inches to yards and fraction of yards.
2. Lay out pattern pieces and figure yardage needs for construction of garments.

Teaching Aids:

Chalk
Chalkboard
Metal Rulers
Tape
Pattern Pieces

I. Preparation of the Learner:

If you had a customer bring in an old pair of slacks and ask you to make another identical pair, how would you determine the amount of fabric needed?

II. Presentation:

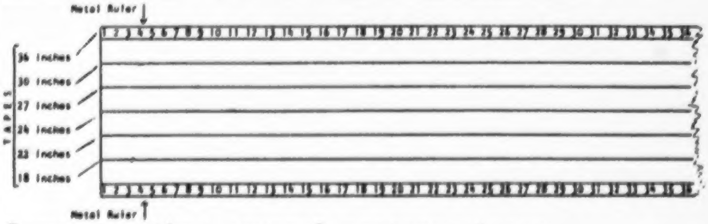
CONCEPT	CLASSROOM ACTIVITIES
Converting inches to yards	Chalkboard talk: Use Teacher Information Sheet to demonstrate how to convert inches to yards and fraction of yards.
Yardage for pattern pieces	Demonstration measuring table: Make a measuring table to assist students in determining total yardage required to construct a garment. Mark table top lengthwise with tape to represent standard fabric widths of 36, 44, 48, 54, 60, and 72 inch material. The lines will occur at the "fold" or at 18 inches for 36 inch wide fabric, 22 inches for 44 inch fabric, and so on. Purchase two metal rulers as long as the table. Screw one securely on each edge. Students can then lay one pants front and one back in the space representing 36 inch wide fabric to determine the total yardage needed. (Example next page)

II. Presentation:

CONCEPT

Yardage for pattern pieces (cont'd - example of table)

CLASSROOM ACTIVITIES


Metal Ruler
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
TAPES
36 inches
30 inches
27 inches
24 inches
22 inches
18 inches
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
Metal Ruler

Group together several pattern pieces. Have students determine the required yardage for these pieces using: 1) 36" wide fabric, 2) 44" wide fabric, and 3) 60" wide fabric.

Help students develop a rule of thumb for determining fabric requirements for individual pattern pieces and for individual garments. Long sleeves require 3/4 yard; straight or simple A-line skirt, 7/8 yard of 54" fabric.

III. Application:

Using the assignment sheet, have students complete the Skill Builder activities individually or in groups.

IV. Evaluation:

CONVERTING INCHES TO YARDS AND FRACTION OF YARDS

Directions:

Convert the following inches to yards and fraction of yards.

1. 144 inches = __________yards
2. 432 inches = __________yards
3. 91 inches = __________yards
4. 63 inches = __________yards
5. 239 inches = __________yards
6. 496 inches = __________yards
7. 87 inches = __________yards
8. 41 inches = __________yards
9. 9 inches = __________yards
10. 12 inches = __________yards

ASSIGNMENT SHEET

Math Concept: Converting Inches to Yards

Task: Compute Yardage for Pattern Pieces

Why learn this?

The yardage is not always given on the back of a pattern envelope. You may be making only one piece of a two or three piece outfit, or you may be using a fabric with width not given. If you have taken a garment apart to use for a pattern, you will not have a yardage requirement chart. You should be able to estimate the amount of fabric needed for a set number of pattern pieces.

Principle Emphasized:

Converting inches to yards.

Words to Know:

Estimate
Lengthwise grainline
Nap
One-way design
Selvage
Simulate

Resources: Information Sheet - Determining Required Yardage for Pattern Pieces

---

1. Read the resources
2. Complete Skill Builder - Words to Know
3. Complete Skill Builder - Conversions

INFORMATION SHEET

DETERMINING REQUIRED YARDAGE
FOR PATTERN PIECES

To estimate the amount of fabric needed for a garment or part of a garment, simulate a folded piece of fabric half the width of the fabric to be used.

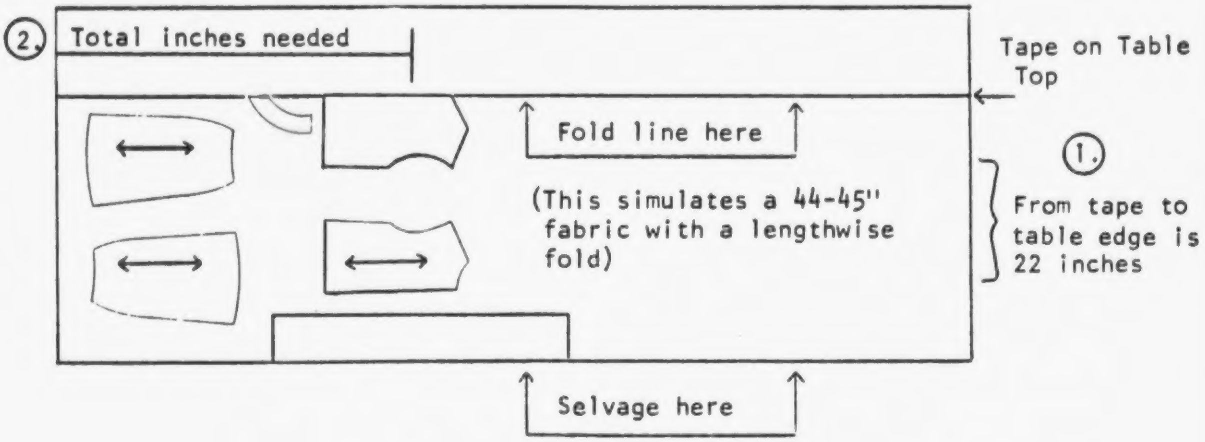
EXAMPLE: If the fabric to be used is 36 inches wide, the simulated area where pattern pieces are to be laid out will be 18 inches wide.

1. Carefully place masking tape up to the number of inches from the table edge needed to simulate a piece of fabric folded lengthwise. The tape becomes the folded edge while the selvages are placed even with the edge of the table.

2. Fit pattern pieces as closely together as possible, being careful to place each piece on the lengthwise grainline. Follow an imaginary thread running the full length of the table (fabric) and parallel with the edge (selvages). Extra large pieces may require a simulated crosswise fold. "Cut one only" pattern pieces must be considered on a one-to-one basis.

CAUTION: If fabric to be used has a nap or one-way design, all pattern pieces must be laid the same direction. The brushed or smoothed-down surface of a nap fabric will cause it to change color when laid in a different direction. One-way design fabrics must be cut so that the designs are all right side up.

PATTERN LAYOUT:


②
Total inches needed
Tape on Table Top
Fold line here
①
(This simulates a 44-45" fabric with a lengthwise fold)
From tape to table edge is 22 inches
Selvage here

SKILL BUILDER

WORDS TO KNOW

Directions:

After reading the Information Sheet, complete the following sentences with the best word or words.

Total inches needed
22
Selvage
Lengthwise grainline
Estimate
Nap
Simulate
Tape
One-way fabric
36

1. To ________________ is to calculate approximately.

2. A folded piece of fabric is simulated by placing ________________ on a worktable half the width of the fabric to be used.

3. If an actual piece of fabric is 44 inches wide, the simulated fold will be ______________ inches wide.

4. A ______________ fabric has a surface texture which is usually brushed or smoothed one way.

5. __________________________ must be cut so that the designs are all right side up.

6. The ______________________ runs the full length of a piece of fabric.

7. The ______________________ is the finished edge of the fabric.

8. When all pattern pieces have been placed on the simulated fabric, the measurement is for ___________________________. This number must be divided by __________________ in order to find out how many yards of fabric are needed.

SKILL BUILDER

CONVERSIONS

1. Fill in the correct number of inches.

a. 1 yard = __________inches
b. 1/2 yard = __________inches
c. 1/4 yard = __________inches
d. 1/8 yard = __________inches
e. 3/8 yard = __________inches
f. 5/8 yard = __________inches
g. 7/8 yard = __________inches

2. Fill in the eighth of a yard quantity equal to, or more than, the amount needed for inches remaining.

a. 3 inches = __________
b. 13½ inches = __________
c. 9 inches = __________
d. 19 inches = __________
e. 4½ inches = __________
f. 30 inches = __________
g. 26 inches = __________
h. 27 inches = __________
i. 35 inches = __________
j. 21 inches = __________
k. 18 inches = __________
l. 31½ inches = __________

3. Complete the total yards needed.

a. Total number of inches needed 90
Yards needed? ______

b. Total number of inches needed 233
Yards needed? ______

c. Total number of inches needed 49
Yards needed? ______

d. Total number of inches needed 139
Yards needed? ______

e. Total number of inches needed 154
Yards needed? ______

f. Total number of inches needed 128
Yards needed? ______

g. Total number of inches needed 364
Yards needed? ______

SKILL BUILDERS

ANSWER SHEET

Words to Know

1. Estimate
2. Tape
3. 22
4. Nap
5. One-way fabric
6. Lengthwise grainline
7. Selvage
8. Total inches needed; 36

Conversions

1. a. 36
   b. 18
   c. 9
   d. 4 1/2
   e. 13 1/2
   f. 22 1/2
   g. 31 1/2
2. a. 1/8
   b. 3/8
   c. 1/4
   d. 5/8
   e. 1/8
   f. 7/8
   g. 3/4
   h. 3/4
   i. 1
   j. 5/8
   k. 1/2
   l. 7/8
3. a. 2 1/2
   b. 6 1/2
   c. 1 3/8
   d. 3 7/8
   e. 4 3/8
   f. 3 5/8
   g. 10 1/8

a bird's eye view

COMPUTING YARDAGE FOR REPEAT FABRIC

Understand this math concept:

Multiplying and dividing inches and fractions

Teacher Materials
Information Sheet
Sample Lesson Plan

Student Materials

Assignment Sheet:	Compute Yardage for Repeat Fabric
Information Sheet:	Compute Yardage for Repeat Fabric
Skill Builders:	Words to Know Repeat Work Sheet Fabric Repeats Problems Problems Problems

TEACHER INFORMATION SHEET

Understand this math concept:

Multiplying and dividing inches and fractions

Multiplying By A Fraction

$3 \times 1/2 = \frac{3}{1} \times \frac{1}{2} = \frac{3}{2} = 1\ 1/2$

$4 \times 2/3 = \frac{4}{1} \times \frac{2}{3} = \frac{8}{3} = 2\ 2/3$

$\frac{1}{4} \times \frac{1}{5} = \frac{1}{20}$

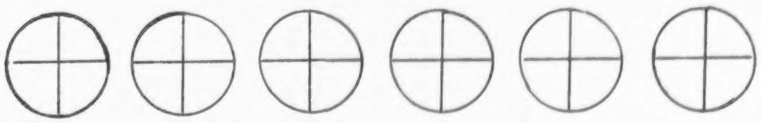
$\frac{1}{4} \times \frac{7}{10} = \frac{7}{40}$

$\frac{9}{10} \times \frac{3}{7} = \frac{27}{70}$

$1\ 3/4 \times 4 = \frac{5}{3} \times \frac{4}{1} = \frac{20}{3} = 6\ 2/3$

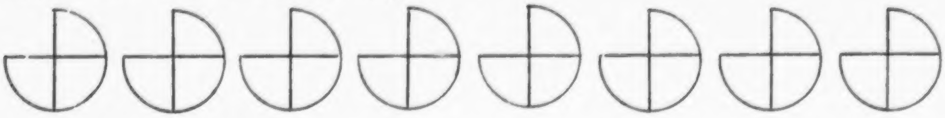
Dividing By A Fraction

$6 \div \frac{3}{4} =$



$(6 = \frac{24}{4})$

Divided with 3/4 in each group:



How many 3/4 in 6? 8

What Were The Steps?

1. First you divided by 1/4 to find how many 1/4's were in 6. $\frac{24}{4}$
2. Then you divided by 3 to find how many 3/4's were in 6 $(\frac{24}{4})$ 8

OR

$$6 \div \frac{3}{4} = 6 \times 4 \times \frac{1}{3} = \frac{24}{3} = 8 \text{ or } \frac{6}{1} \times \frac{4}{3} = \frac{24}{3} = 8$$

$$6 \div \frac{1}{3} = \frac{6}{1} \times \frac{3}{1} = \frac{18}{1} = 18$$

$$9 \div \frac{1}{4} = \frac{9}{1} \times \frac{4}{1} = \frac{36}{1} = 36$$

$$12 \div \frac{2}{3} = \frac{12}{1} \times \frac{3}{2} = \frac{36}{2} = 18$$

$$\frac{3}{4} \div \frac{1}{2} = \frac{3}{4} \times \frac{2}{1} = \frac{6}{4} = 1\ 2/4 = 1\ 1/2$$

$$\frac{3}{4} \div \frac{2}{3} = \frac{3}{4} \times \frac{3}{2} = \frac{9}{8} = 1\ 1/8$$

$$1\frac{3}{4} \div \frac{2}{3} = \frac{7}{4} \times \frac{3}{2} = \frac{21}{8} = 2\ 5/8$$

Multiplication of Inches

$$24 \text{ inches} \times 3 = \begin{array}{r} 24 \text{ inches} \\ \times \underline{\ 3\ } \\ 72 \text{ inches} \end{array}$$

$$24\frac{1}{3} \text{ inches} \times 4 = (24 \times 3 \times 1 = \frac{73}{3}) = \frac{73}{3} \times \frac{4}{1} = \frac{292}{3} = 97\frac{2}{3} \text{ inches}$$

Division of Inches

$$72 \text{ inches} \div 3 = \begin{array}{r} 24 \text{ inches} \\ 3\,\overline{)\,72\;\;\;} \\ \underline{6\;\;\;\;\;} \\ 12\;\;\; \end{array}$$

$$97\frac{2}{3} \text{ inches} \div 4 = \frac{292}{3} \div \frac{4}{1} = \frac{292}{3} \times \frac{1}{4} = \frac{292}{12} = 24\frac{1}{3} \text{ inches}$$

SAMPLE LESSON PLAN

Math Concept: Multiplication and Division of Inches and Fractions
Task: Compute Yardage for Repeat Fabric

Objective: The student will be able to:

1. Multiply and divide inches and fractions.
2. Compute the extra yardage needed for repeat fabrics.

Teaching Aids:

Magazines with window treatment pictures
Lengths of fabric with repeats
Yardstick

I. Preparation of the Learner:

Have students find an example of a window treatment using fabric with repeats in magazines and pamphlets. Have each student share the illustration with the total class.

II. Presentation:

CONCEPT	CLASSROOM ACTIVITY
Measuring repeats	Demonstration: Using several lengths of fabric with repeats, identify the repeat and show students how to measure the repeat.
Placement of repeat	Give students some magazines. Have them select examples of window treatments with repeat fabrics. Evaluate each example for number of repeats and placement of repeats.
Computing yardage for repeat fabrics	Show the students several lengths of fabrics with repeats. Identify repeats, discuss their proper placement if used for window treatments, and simulate and work some problems for each on chalkboard.
Multiplication and division of fractions	Chalkboard Talk: Using Teacher Information Sheet, demonstrate how to multiply and divide fractions.

III. Application:

Have students complete Skill Builders on the assignment sheet individually or in groups.

IV. Evaluation

TEST - MULTIPLYING AND DIVIDING FRACTIONS

Directions:

Practice multiplying and dividing fractions by completing the following problems.

1. $7 \times \frac{3}{4} =$ __________

2. $9 \times \frac{2}{3} =$ __________

3. $1\frac{2}{3} \times \frac{4}{5} =$ __________

4. $1\frac{6}{9} \times \frac{8}{9} =$ __________

5. $\frac{7}{8} \times \frac{6}{7} =$ __________

6. $7 \div \frac{3}{4} =$ __________

7. $6 \div \frac{2}{3} =$ __________

8. $1\frac{4}{5} \div \frac{1}{2} =$ __________

9. $6\frac{7}{8} \div \frac{1}{3} =$ __________

10. $\frac{1}{3} \div \frac{1}{2} =$ __________

ASSIGNMENT SHEET

Math Concept: Multiplying and Dividing Inches and Fractions

Task: Compute Yardage for Repeat Fabric

Why learn this?

Draperies made from plain fabric are measured one panel after another with little waste material between them. When the material has a pattern that repeats, extra fabric is wasted between panels so that the floral, geometric, or striped design appears in the same place on all pieces and is not mismatched. The drapery maker has to know how to measure for this extra yardage so that mistakes are not made.

Principle Emphasized:

Multiplying and dividing inches and fractions.

Words to Know:

Cut Length
Cut Width
Double Hem
Finished Length
Heading

Motif
Panel
Repeat

Resources: Information Sheet - Compute Yardage for Repeat Fabric

---

1. Read the resource
2. Complete Skill Builder - Words to Know
3. Complete Skill Builder - Repeat Work Sheet
4. Complete Skill Builder - Fabric Repeats
5. Complete Skill Builder - Problems Problems Problems

INFORMATION SHEET

COMPUTE YARDAGE
FOR REPEAT FABRIC

Repeat

The variety of patterns staggers the imagination - prints, plaids, stripes, checks. Unless the pattern is a small, all-over design, extra yardage might be needed for matching the pattern on all panels. The amount depends upon the size of the "repeat" which is often noted on drapery fabric.

A "repeat" is one complete pattern or design on the fabric - the distance from the top of the motif to the top of the same motif when it next appears.* It may be necessary to buy extra fabric to allow for this because each panel must begin and end at the same points in the design and all drapes in the room must match.

* A motif is one complete single design in a series of that design found in a print.

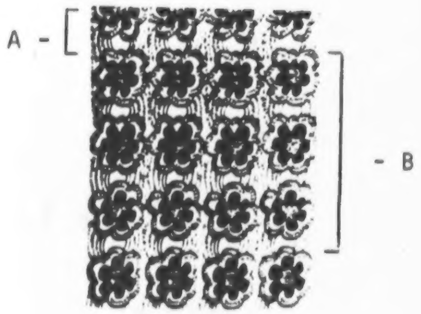
Placement of Design

In addition to matching a patterned fabric, one must consider placement of the design for the most pleasing effect. Whenever possible, place an unbroken repeat on the portion nearest to eye level. This would be at the finished top on long draperies. A broken repeat will not be noticeable at the floor. On short draperies, the opposite is true. A broken repeat at the bottom is more noticeable because it's more nearly at eye level.

NOTE: When cutting floor length draperies or curtains, find the top of the motif and add the allowance for the crinoline to the top. The crinoline allowance is double the width of the crinoline plus one inch.

A - Allowance for crinoline

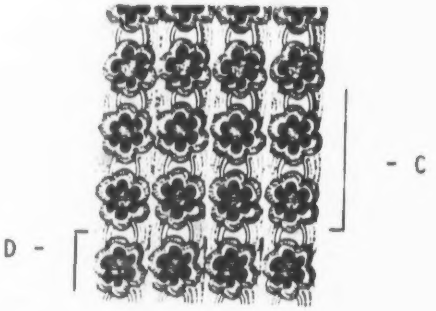
B - A complete motif which will finish out at the top of the panel



With shorter draperies or curtains which have the hems nearer to eye level, the bottom of the motif is placed at the bottom of the drapery, and the width of a double hem is added to the bottom edge.

C - Allowance for hem

D - A complete motif which will finish out at the bottom of the panel



Figuring Repeat

When computing yardage requirements for fabrics with repeats, you must figure the cut length using full repeats.

Let's use an example of floor length draperies that have a 91" finished length. You would add 9" for the heading (4" crinoline doubled plus 1" for ravel and adjustment) and 8" for hem (a double 4" hem).

91 + 9 + 8 = 108"

Let's assume you have fabric with a repeat of 28". Divide 108" by 28". Any remainder becomes a full repeat.

		3	Full repeats
Size of repeat	28"	)108"	Cut length needed
		84	
		24	Remainder becomes a full repeat. You must have 4 repeats for each cut length.

Size of repeat	28
Number of repeats	x 4
Required cut length	112

You will need 112" for each cut length.

Again! Let's look at the same problem another way. When you divide cut length needed by the size of the repeat, your answer is between 3 and 4 repeats. In order to match you must have 4 repeats. Each cut length would require 112". To compute yardage needed you will multiply the required cut length by the number of widths needed and then divide by 36" to convert to yardage.

Required cut length	112"
Number of widths needed	x 4
Inches needed	448"

Inches in a yard

$$\begin{array}{r} 12 \\ 36'' \overline{)448} \\ \underline{36} \\ 88 \\ \underline{72} \\ 16 \end{array} = 1/2 \text{ yard}$$

The amount of fabric needed would be 12 1/2 yards.

Again! Let's do another problem. The cut length is 64", the fabric repeat is 19", and 3 widths are needed.

Size of repeat	19"
Number of repeats	x 4
Required cut length	76
Number of widths needed	x 3
Inches needed	228"

Size of repeat

$$\begin{array}{rl} 3 & \text{Full repeats} \\ 19'' \overline{)64} & \text{Cut length} \\ \underline{57} & \\ 7 & \text{Becomes a } \underline{\text{full}} \text{ repeat} \end{array}$$

Inches in a yard

$$\begin{array}{rl} 6 & \\ 36'' \overline{)228} & \text{Total inches} \\ \underline{216} & \text{needed} \\ 12 & = \frac{12}{36} = \frac{1}{3} \end{array}$$

How many repeats will you have? 4

How long will each length be cut after considering repeat? 76

How much fabric will be needed? 6 1/3 yards

SKILL BUILDER

WORDS TO KNOW

Directions:

Read the definitions below. Find the words they are defining in the scramble puzzle. Circle the word and mark the number of its definition beside it. The words may be horizontal, vertical, diagonal, or backwards.

DEFINITIONS

1. One complete single design in a series of that design found in a print.
2. One complete pattern on the fabric, the distance from the top of the motif to the top of the same motif when it next appears.
3. The finished length plus heading and hem allowance.
4. The finished width plus allowance for side hems, seams and fullness.
5. A single unit of a window treatment, may consist of a single fabric width or of two or more widths seamed together.
6. The top of a curtain or drapery.
7. A hem turned twice the same width.
8. The length of a drapery panel as it will hang at the window.

WORDS USED IN THE PUZZLE

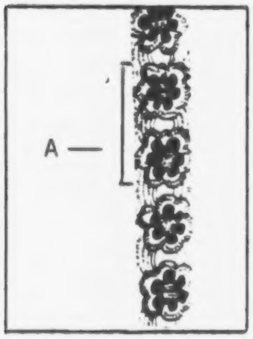
Heading
Repeat
Cut Length
Cut Width
Panel
Motif
Double Hem
Finished Length

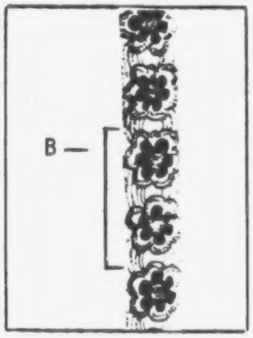
B	F	R	F	I	T	O	M	U	D
G	I	Q	S	E	A	T	I	V	C
P	N	H	I	N	E	J	W	L	U
K	I	Y	O	X	F	G	M	H	T
D	S	J	R	F	L	V	R	M	L
O	H	C	D	E	L	E	M	P	E
U	E	Z	K	K	P	B	N	L	N
B	D	X	S	E	J	E	U	E	G
L	L	P	A	N	E	L	A	A	T
E	E	A	C	K	C	H	R	T	H
H	N	G	L	D	U	B	Z	A	S
E	G	O	W	E	T	C	P	Q	O
M	T	F	T	Y	W	I	S	B	A
B	H	E	A	D	I	N	G	X	Y
E	W	F	D	U	D	O	L	L	N
V	K	H	C	W	T	V	S	M	E
H	I	M	P	N	H	S	R	Z	T

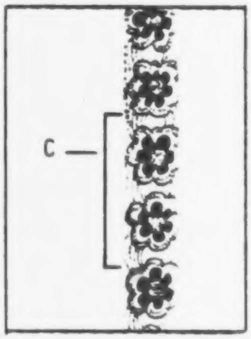
SKILL BUILDER

REPEAT WORK SHEET

1. Which illustration shows the correct way to measure a repeat? ____

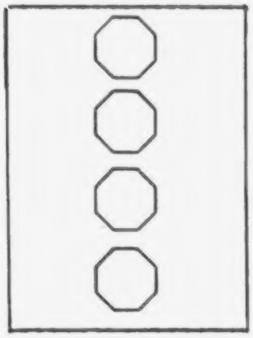




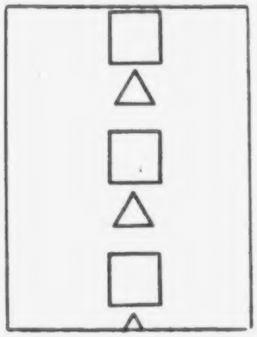


2. Mark the repeat in the following illustrations.

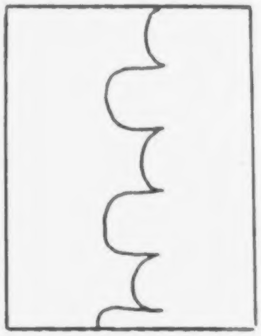
A



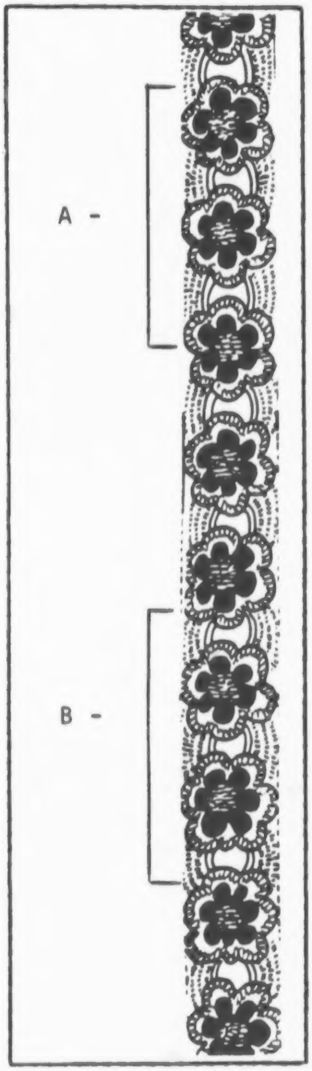
B



C



3. An apron length finished panel should have placement of repeats as found in A or B? ____________



4. A floor length finished panel should have placement of repeats as in A or B? ______________

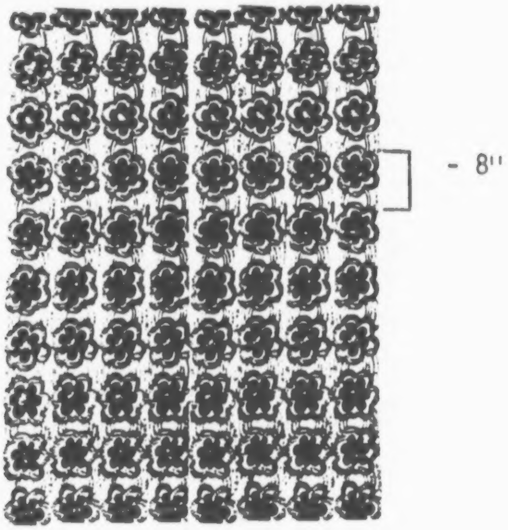
SKILL BUILDER

FABRIC REPEATS

Directions:

Using drapery fabric samples, find five (5) fabrics that have repeats. Measure the repeats and mount the fabric samples in notebook form. Mark and label width of repeat.

Example:



SKILL BUILDER

PROBLEMS PROBLEMS PROBLEMS

PROBLEM A

Cut length 95"

Fabric repeat 22"

4 widths

1. How many repeats will be in one cut length? ___________
2. How long will each cut length be after considering the repeat? ___________
3. How much fabric will be needed to cut 4 widths of drapery fabric? _______

PROBLEM B

Cut length 45"

Fabric repeat 15"

6 widths

1. How many repeats will be in one cut length? ___________
2. How long will each cut length be after considering the repeat? ___________
3. How much fabric will be needed to cut 6 widths of drapery fabric? ________

PROBLEM C

Cut length 36"

Fabric repeat 12"

3 widths

1. How many repeats will be in one cut length? ___________
2. How long will each cut length be after considering the repeat? ___________
3. How much fabric will be needed to cut 3 widths of drapery fabric? ________

PROBLEM D

Cut length 84"

Fabric repeat 18"

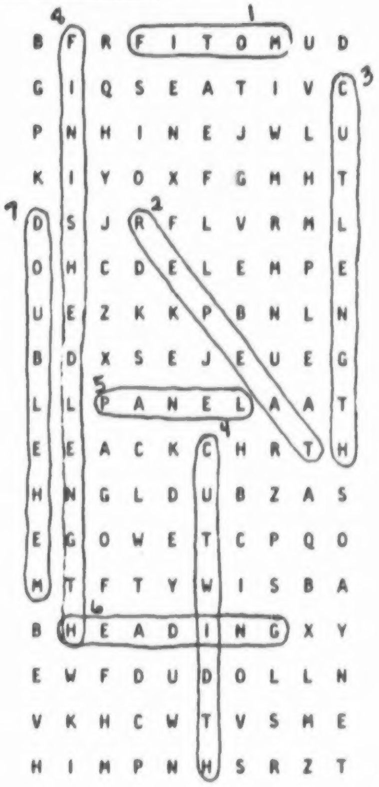
5 widths

1. How many repeats will be in one cut length? ___________
2. How long will each cut length be after considering the repeat? ___________
3. How much fabric will be needed to cut 5 widths of drapery fabric? ________

SKILL BUILDERS

ANSWER SHEET

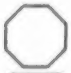
Words to Know

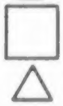


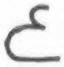
B	F	R	F	I	T	O	M	U	D
G	I	Q	S	E	A	T	I	V	C
P	N	H	I	N	E	J	W	L	U
K	I	Y	O	X	F	G	M	H	T
D	S	J	R	F	L	V	R	M	L
O	H	C	D	E	L	E	M	P	E
U	E	Z	K	K	P	B	N	L	N
B	D	X	S	E	J	E	U	E	G
L	L	P	A	N	E	L	A	A	T
E	E	A	C	K	C	H	R	T	H
H	N	G	L	D	U	B	Z	A	S
E	G	O	W	E	T	C	P	Q	O
M	T	F	T	Y	W	I	S	B	A
B	H	E	A	D	I	N	G	X	Y
E	W	F	D	U	D	O	L	L	N
V	K	H	C	W	T	V	S	M	E
H	I	M	P	N	H	S	R	Z	T

1. Motif
2. Repeat
3. Cut length
4. Cut width
5. Panel
6. Heading
7. Double hem
8. Finished length

Repeat Work Sheet

1. B
2. A 

   B 

   C 
3. B
4. A

Problems Problems Problems

Problem A

1. 5
2. 110
3. 12 1/4 yards

Problem B

1. 3
2. 45
3. 7 1/2 yards

Problem C

1. 3
2. 36
3. 3 yards

Problem D

1. 5
2. 90
3. 12 1/2 yards

a bird's eye view

COMPUTING YARDAGE FOR ROMAN SHADES

Understand this math concept:

Measuring, adding, and subtracting units of measure

Teacher Materials
Information Sheet
Sample Lesson Plan

Student Materials
Assignment Sheet: Measuring, Adding, and Subtracting Units of Measure
Information Sheet: Window Talk - Roman Shades
Skill Builders: Window Talk - Crossword Puzzle
Yardage Needed for Roman Shades

TEACHER INFORMATION SHEET

Understand this math concept:

Measuring, adding, and subtracting
units of measure

Inch as a Unit of Measure

An inch is divided into:
- half inch
- fourth inch
- eighth inch
- sixteenth inch

12 inches equal 1 foot
36 inches equal 1 yard
3 feet equal 1 yard

Adding Units of Measure

(12 inches = 1 foot)

1 foot, 9 inches + 2 feet, 8 inches

Feet	Inches
1	9
+2	+8
3	17

= 4 feet, 5 inches

4 yards, 1 foot, 6 inches + 7 yards, 4 feet, 10 inches

Yards	Feet	Inches
4 +7 11	1 +5 6	6 +10 16

= 13 yards, 1 foot, 4 inches

Subtracting Units of Measure

Feet	Inches
6 -2 4	3 -1 2

Feet	Inches
3 -1	2 -9

=

Feet	Inches
2 -1 1	14 -9 5

Yards	Feet	Inches
10 -2	8 -9	4 -6

=

Yards	Feet	Inches
9 -2 7	10 -9 1	16 -6 4

SAMPLE LESSON PLAN

Math Concept: Measuring, Adding, and Subtracting Units of Measure
Task: Computing Yardage for Roman Shades

Objective: The student will be able to:

1. Measure to the nearest inch, half inch, fourth inch, and eighth inch.
2. Perform an addition with units of measure
3. Compute the yardage needed for Roman shades

Teaching Aids:

12 Inch Plastic Ruler
Yardstick for Class

I. Preparation of the Learner:

Accurate measurement is critical when calculating yardage for Roman shades.

II. Presentation:

CONCEPT	CLASSROOM ACTIVITY
Measuring	The inch is the standard unit of measure. A measurement is more precise when a smaller unit of measure is used. Use a plastic ruler on the overhead projector to show inch, half inch, fourth inch, eighth inch.
Addition and Subtraction of Units of Measure	Chalkboard Talk: Use Teacher Information Sheet to show how to add or subtract units of measure.
Measuring Windows	Demonstration: Measure a classroom window.

II. Presentation:

CONCEPT	CLASSROOM ACTIVITY
Computing Yardage for Roman Shades	Use Student Information Sheet to show how to calculate fabric needed to make a Roman shade.

III. Application:

Have the students complete Skill Builders on the assignment sheet individually.

IV. Evaluation

Add the following:

1. 1 yard, 2 feet + 2 yards, 11 inches = ________
2. 1 foot, 11 inches + 3 yards, 6 inches = ________
3. 3 feet, 2 inches + 6 feet, 11 inches = ________
4. 6 feet, 3 inches + 7 feet, 3 inches = ________
5. 1 yard, 2 feet, 3 inches + 2 yards, 2 feet, 9 inches = ________

Subtract the following:

6. 2 feet, 9 inches - 1 foot, 3 inches = ________
7. 3 feet, 3 inches - 2 feet, 9 inches = ________
8. 1 yard, 2 feet - 3 feet = ________
9. 3 yards, 2 feet, 1 inch - 1 yard, 3 feet, 2 inches = ________
10. 4 yards, 2 feet, 6 inches - 1 yard, 3 feet, 7 inches = ________

Quest Activities:

1. Have the students look for pictures of Roman shades and make a collage of pictures found in catalogs and magazines.
2. Have the students find fabrics that are suitable for making Roman shades; mounting the sample, students should coordinate the fabric with an appropriate shade sytle, and choose suitable trims for the fabric type and color.
3. Have students design a decorative skirt bottom. Have them choose trims and colors to coordinate with the shade style they designed.

ASSIGNMENT SHEET

Math Concept: Measuring, Adding, and Subtracting Units of Measure

Task: Computing Yardage for Roman Shades

Why learn this?

Before constructing Roman shades, you will need to know how to compute the yardage required. After completing the following, you will be able to compute yardage for Roman shades with or without a decorative skirt.

Principle Emphasized: Measuring, adding, and subtracting units of measure

Words to Know:

- Accordian
- Adjusted Cut Length
- Cut Length
- Cut Width
- Decorative Skirt
- Double Hem
- Inside Mount
- Outside Mount
- Parallel
- Perpendicular
- Proportion
- Roman Shade
- Side Hem
- Valence

Resources: Information Sheet: Window Talk - Roman Shades

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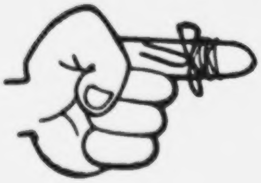
1. Read the information sheet
2. Complete Skill Builder - Words to Know
3. Complete Skill Builder - Computing Yardage for Roman Shades

INFORMATION SHEET

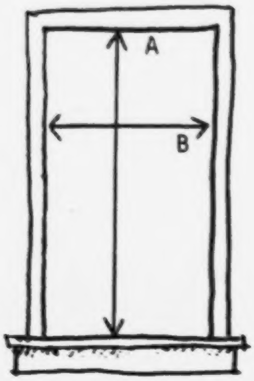
WINDOW TALK - ROMAN SHADES



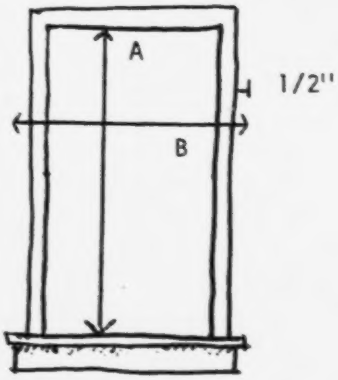
A ROMAN SHADE is a window covering that draws up into horizontal folds (an accordian effect) by means of cords threaded through rings attached to the back at regular intervals.

A Roman shade is adaptable to a variety of decor. It may be finished with a simple hem, accented with contrasting trim, or dressed up with a decorative skirt or valence. A valence is a short, stationary panel usually attached to a curtain rod and hung at the top of a window treatment for decorative interest. It hides the top of rods or shades. A decorative skirt is a finishing touch or special fabric trimming added to the bottom of the Roman shade.

To determine how much fabric is needed for the Roman shade, start with the finished width and length. Roman shades can either be an outside mount or inside mount. The outside mount is an arrangement in which brackets are mounted outside the window frame. An inside mount is an arrangement in which brackets are mounted inside the window frame. Once it is determined whether the mount is to be inside or outside, you can measure the finished width of the shade.



inside mount



outside mount

Width of window to outside frame plus 1/2 inch allowance on both sides. This prevents light from shining in when the shade is drawn.

A. finished width measurement
B. finished length measurement

After determining the finished width and length of the Roman shade, begin computing the cut width and cut length.

FORMULA FOR COMPUTING CUT WIDTH

Finished width + *side hem allowances = cut width.

*Usually 2 inches side hem allowance; double 1/2 inch side hems on both sides of the shade.

SAMPLE PROBLEM

Now let's work a problem using the formula. The finished width of the shade is 42 inches. The side hems are 1/2 inch finished, and the fabric is 48 inches wide.

What is the cut width? 44 inches

How many widths are needed? 1 width

Formula: 42 inches + 2 inches = 44 inches. THE FABRIC IS 48 INCHES WIDE, SO ONE CUT WIDTH IS NEEDED.

ADDITIONAL PROBLEMS -- Let's work a few more problems.

A. 39 inch finished width
1/2 inch finished side hems
48 inch wide fabric

39 inches + 2 inches = 41 inches, cut width;
one cut width needed

B. 50 inch finished width
1/2 inch finished side hems
54 inch wide fabric

50 inches + 2 inches = 52 inches, cut width;
one cut width needed

WHEN THE CUT WIDTH IS WIDER THAN THE FABRIC

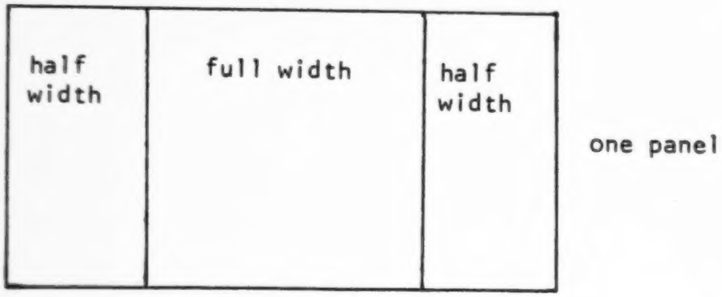
If the cut width is wider than the width of fabric, cut as many widths as needed to equal the cut width figure. The first step in this process is to divide the cut width by the width of the fabric. This will tell how much extra width is needed. For example, the cut width is 58 inches and the fabric is 48 inches wide:

1. Divide 58 inches by 48 inches; this leaves 10 inches for required extra width.

$$\begin{array}{r} 1 \\ 48 \,/\, \overline{58} \\ -48 \\ \hline 10 \end{array}$$

2. Cut two lengths of fabric, then cut one in half lengthwise.

3. Sew the panels together as shown in the illustration, one on each side of the larger panel.



Most Roman shades require one to two widths of fabric. Very rarely will more than two widths be sewn together. When determining where to seam the fabric, keep in mind that there should be a row of rings behind each seam and that all rows of rings should be spaced evenly across the shade. The rings are usually 8 to 12 inches apart. If they are not spaced evenly, the horizontal pleats will not form correctly when the shade is drawn up.

The success of a Roman shade depends upon the shade being a perfect rectangle, with square corners and parallel sides, so be sure that the seams are absolutely straight and parallel to the side edges.

FORMULA FOR SEAM ALLOWANCES

cut width + 1 inch allowance for each seam = adjusted cut width

Because there is no fullness in the width of a Roman shade, a one inch allowance must be added to the cut width for each required seam. After computing the cut width and the number of widths needed, count the number of seams in the shade. Add the proper seam allowance to the cut width. For example, if the cut width is 90 inches and the fabric width is 48 inches, two widths of fabric are needed. Cut one width in half lengthwise, and seam one on each side of the full width. The shade will have two seams. Add 2 inches (1 inch for each seam) to the cut width to allow for the two seams in the shade.

SAMPLE PROBLEMS: Let's try a few problems.

C. 59 inch cut width
2 number of seams

What is the adjusted cut width? 61 inches

(59 inches + 2 inch seam allowance = 61 inches)

D. 70 inch cut width
2 number of seams

What is the adjusted cut width?

(70 inches + 2 inch seam allowance = 72 inches)

FORMULA FOR COMPUTING CUT LENGTH

Finished length + 3 inches for mounting + *double hem allowance = cut length.

*Usually 8 inches for double 4 inch hems.

SAMPLE PROBLEMS: Let's try a few problems. If the finished width of the shade is 35 inches, with a double 3 inch hem, what is the cut length?

35 inches + 3 inch (mounting) + 6 inches (double 3 inch hem) = 44 inch cut length

OR

35 inches + 9 inches (mounting plus double hem) = 44 inch cut length.

ADDITIONAL PROBLEMS

E. 63 inches finished length
4 inches double four inch hem

What is the cut length? 74 inches

63 inches + 3 inches + 8 inches = 74 inches

OR

63 inches + 11 inches = 74 inches

F. 42 inches finished length
4 inches double four inch hem

What is the cut length? 53 inches

42 inches + 3 inches + 8 inches = 53 inches cut length

OR

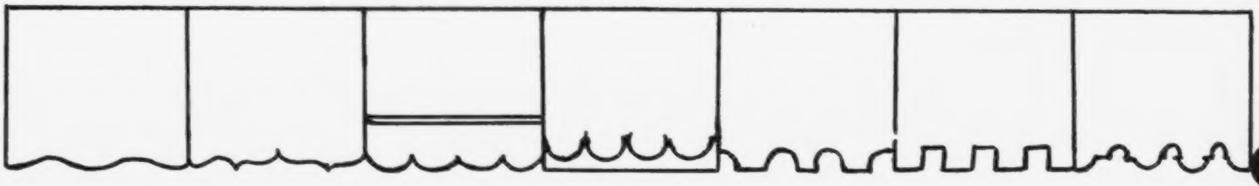
45 inches (finished length + mounting) + 8 inches = 53 inches cut length.

The amount allowed for the bottom hem can vary depending upon the proportions of the shade. If you are making a short shade (up to 36 inches long), allow a double 3 inch hem. If the shade will be long (over 72 inches), you may want to make a double 6 inch hem. A decorative skirt might be added to an outside-mounted shade. This will affect the cut length.

When a shade has a skirt, the slat or rod falls at the bottom of the window sill, with the skirt hanging below. For better draping, skirts look best on outside-mounted shades.

Six inches is a common depth for a decorative skirt, but let the proportions of the shade guide the decision about the most appropriate depth.

You can shape the skirt as you wish. Experiment by drawing symmetrical designs using curves and notches. The pattern of the fabric could be followed for the skirt design. The drawings below are popular skirt designs.



FORMULA FOR COMPUTING A ROMAN SHADE WITH A DECORATIVE SKIRT

Finished length + 3 inches for mounting + 2 times the depth of the *skirt equals cut length.

*The skirt of the shade is folded back to form a facing.

SAMPLE PROBLEMS:

Let's try computing the cut length of a Roman shade. The finished length of the shade is 36 inches, and the depth of the skirt is 6 inches.

36 inches + 3 inches + 2 (6 inches) =
36 inches + 3 inches + 12 inches = 51 inches

51 inches is the cut length of shade with decorative skirt

OR

39 inches (finished length + mounting) + 12 inches = 51 inches.

ADDITIONAL PROBLEMS:

G. 45 inches finished length
6 inches depth of skirt

What is the cut length? 60 inches

45 inches + 3 inches + 2 (6 inches) =
45 inches + 3 inches + 12 inches =
45 inches + 15 inches = 60 inches cut length

H. 84 inches finished length
12 inches depth of skirt

What is the cut length? 111 inches

84 inches + 3 inches + 2 (12 inches) =
84 inches + 3 inches + 24 inches =
84 inches + 27 inches = 111 inches cut length

SKILL BUILDER

WINDOW TALK

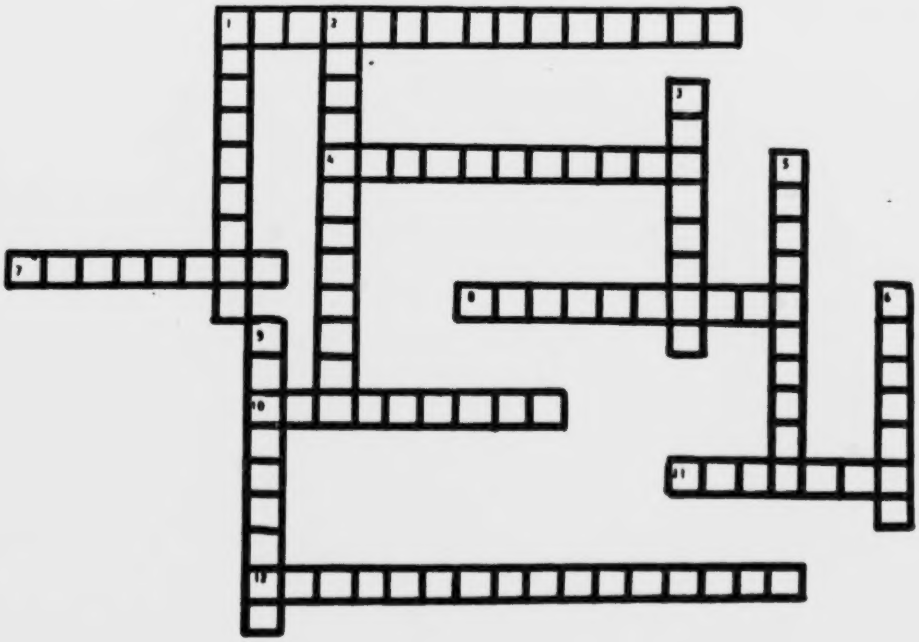
CROSSWORD PUZZLE

ACROSS

1. An extra piece of fabric added to the bottom of a Roman shade.
4. A situation in which brackets are mounted inside the window frame.
7. Two lines that are equal distance apart.
8. Mathematics ratio.
10. Finished length plus 3 inches for mounting plus double hem allowance.
11. A short, stationary panel usually attached to a curtain rod and hung at the top of a window treatment for decorative interest.
12. Cut width plus one inch allowance for each seam.

DOWN

1. The width of the bottom hem turned up twice.
2. A situation in which brackets are mounted outside the window frame.
3. Finished width plus side hem allowances.
5. A window covering that draws up into horizontal folds by means of cords threaded through rings.
6. Small hems that run perpendicular with the bottom hem.
9. Horizontal folds effect.



SKILL BUILDER

YARDAGE NEEDED FOR ROMAN SHADES

COMPUTING CUT WIDTH

1. 36 inches finished width
   2 inches side hem allowance
   48 inches fabric width

   What is the cut width? ______

   How many widths are needed? ______

2. 40 inches finished width
   2 inches side hem allowance
   48 inches fabric width

   What is the cut width? ______

   How many widths are needed? ______

3. 51 inches finished width
   2 inches side hem allowance
   54 inches fabric width

   What is the cut width? ______

   How many widths are needed? ______

4. 25 inches finished width
   2 inches side hem allowance
   36 inches fabric width

   What is the cut width? ______

   How many widths are needed? ______

5. 33 inches finished width
   2 inches side hem allowance
   36 inches fabric width

   What is the cut width? ______

   How many widths are needed? ______

COMPUTING ADJUSTED CUT WIDTH

6. 46 inches finished width
2 inches side hem allowance
36 inches fabric width

What is the cut width? ______

How many widths are needed? ______

What is the adjusted cut width? ______

7. 52 inches finished width
2 inches side hem allowance
48 inches fabric width

What is the cut width? ______

How many widths are needed? ______

What is the adjusted cut width? ______

8. 65 inches finished width
2 inches side hem allowance
48 inches fabric width

What is the cut width? ______

How many widths are needed? ______

What is the adjusted cut width? ______

9. 50 inches finished width
2 inches side hem allowance
36 inches fabric width

What is the cut width? ______

How many widths are needed? ______

What is the adjusted cut width? ______

10. 83 inches finished width
2 inches side hem allowance
48 inches fabric width

What is the cut width? ______

How many widths are needed? ______

What is the adjusted cut width? ______

COMPUTING CUT LENGTH WITHOUT DECORATIVE SKIRT

11. 30 inches finished length
3 inches double 3 inch hem

What is the cut length? ______

12. 45 inches finished length
4 inches double 4 inch hem

What is the cut length? ______

13. 82 inches finished length
5 inches double 5 inch hem

What is the cut length? ______

14. 93 inches finished length
5 inches double 5 inch hem

What is the cut length? ______

15. 34 inches finished length
3 inches double 3 inch hem

What is the cut length? ______

16. 52 inches finished length
4 inches double 4 inch hem

What is the cut length? ______

17. 75 inches finished length
5 inches double 5 inch hem

What is the cut length? ______

18. 63 inches finished length
4 inches double 4 inch hem

What is the cut length? ______

COMPUTING CUT LENGTH WITH DECORATIVE SKIRT

19. 54 inches finished length
6 inches skirt depth

What is the cut length? ______

20. 83 inches finished length
8 inches skirt depth

What is the cut length? ______

21. 92 inches finished length
12 inches skirt depth

What is the cut length? ______

22. 64 inches finished length
6 inches skirt depth

What is the cut length? ______

23. 70 inches finished length
10 inches skirt depth

What is the cut length? ______

24. 48 inches finished length
6 inches skirt depth

What is the cut length? ______

25. 52 inches finished length
7 inches skirt depth

What is the cut length? ______

SKILL BUILDERS

ANSWER SHEET

ANSWERS TO "WINDOW TALK" PUZZLE

ACROSS

1. decorative skirt
4. inside mount
7. parallel
8. proportion
10. cut length
11. valence
12. adjusted cut width

DOWN

1. double hem
2. outside mount
3. cut width
5. Roman shade
6. side hem
9. accordian

SKILL BUILDERS

ANSWER SHEET

COMPUTING CUT WIDTH

1. 38 inches cut width
   1 widths needed

2. 42 inches cut width
   1 widths needed

3. 53 inches cut width
   1 widths needed

4. 27 inches cut width
   1 widths needed

5. 35 inches cut width
   1 widths needed

COMPUTING ADJUSTED CUT WIDTH

6. 48 inches cut width
   2 widths needed
   50 inches adjusted cut width

7. 54 inches cut width
   2 widths needed
   56 inches adusted cut width

8. 67 inches cut width
   2 widths needed
   69 inches adjusted cut width

9. 50 inches cut width
   2 widths needed
   52 inches adjusted cut width

10. 85 inches cut width
    2 widths needed
    87 inches adjusted cut width

ANSWER SHEET

COMPUTING CUT LENGTH WITHOUT DECORATIVE SKIRT

11. 39 inches cut length
12. 56 inches cut length
13. 95 inches cut length
14. 106 inches cut length
15. 43 inches cut length
16. 63 inches cut length
17. 88 inches cut length
18. 74 inches cut length

COMPUTING CUT LENGTH WITH DECORATIVE SKIRT

19. 69 inches cut length
20. 102 inches cut length
21. 119 inches cut length
22. 79 inches cut length
23. 93 inches cut length
24. 63 inches cut length
25. 69 inches cut length

ANSWER SHEET

IV. EVALUATION

1. 1 yard 2 feet 0 inches
   2 yards 0 feet 11 inches
   3 yards 2 feet 11 inches = 3 yards, 2 feet, 11 inches

2. 0 yards 1 foot 11 inches
   3 yards 0 feet 6 inches
   3 yards 1 foot 17 inches = 3 yards, 2 feet, 5 inches

3. 0 yards 3 feet 2 inches
   0 yards 6 feet 11 inches
   0 yards 9 feet 13 inches = 3 yards, 1 foot, 1 inch

4. 0 yards 6 feet 3 inches
   0 yards 7 feet 3 inches
   0 yards 13 feet 6 inches = 4 yards, 1 foot, 6 inches

5. 1 yard 2 feet 3 inches
   2 yards 2 feet 9 inches
   3 yards 4 feet 12 inches = 4 yards, 2 feet

a bird's eye view

COUNTING AND RECORDING PATIENT INTAKE AND OUTPUT

Understand this math concept:

Metric measurement of liquids

Teacher Materials
Information Sheet
Sample Lesson Plan

Student Materials

Assignment Sheet:	Measure and Record Patient Intake and Output
Information Sheet:	Measuring Intake and Output
Skill Builders:	Words to Know Recording Patient Intake and Output Converting Standard Measure to Metric Measure

TEACHER INFORMATION SHEET

Understand this math concept:

Metric measurement of liquids

This is how units are named in the metric system.

Kilo - means 1,000 times
Hecto - means 100 times
Deka - means 10 times
Deci - means 0.1 times
Centi - means 0.01 times
Milli - means 0.001 times

Root words are as follows.

Meter	- to measure distance
Liter	- to measure liquids
Gram	- to measure dry weight
Cubic Meter	- to measure volume

LIQUID	
1,000 liters	1 kiloliter
100 liters	1 hectoliter
10 liters	1 dekaliter
10 deciliters	1 liter
100 centiliters	1 liter
1,000 milliliters	1 liter

1,000 liters are: 1 kiloliter
OR
10 hectoliters
OR
100 dekaliters

4,967 liters equal $4\ \frac{\text{kiloliters}}{\text{(thousands)}} + 9\ \frac{\text{hectoliters}}{\text{(hundreds)}} + 6\ \frac{\text{dekaliters}}{\text{(tens)}} + 7\ \frac{\text{liters}}{\text{(ones)}}$

When adding and subtracting in metrics, remember the relationship between units. It is similar to transferring packs of ten.

Centiliters (.01)	Milliliters (.001)
3 + 6	9 + 3
9	12

The Unit of Volume - A cubic meter is a unit used to measure volume. A cubic meter is a cube of which each edge is one meter.

Cubic measures are:

1 cubic hectometer = 1,000,000 cubic meters
1 cubic decameter = 1,000 cubic meters
1 cubic decimeter = .001 cubic meters
1 cubic centimeter = .000 001 cubic meters
1 cubic millimeter = .000 000 001 cubic meters

SAMPLE LESSON PLAN

Math Concept: Metric Measuring - Liquid
Task: Measure and Record Patient Intake and Output

Objective: The student will be able to:

1. Use the metric system for liquid measure.
2. Convert standard measure to liquid measure.
3. Add and subtract liquid metric measures.
4. Convert one metric unit to another.

Teaching Aids:

Bed Pan
Transparency Made From "Recording Patient Intake and Output"
Graduated Metric Measure Pitcher
Copies of Intake and Output Charts for All Students

I. Preparation of the Learner:

Two-thirds of the body weight is water. Knowing the amount of fluid taken in and eliminated is important to the doctor so she/he can diagnose and plan treatment if the patient is not in fluid balance. To do this accurately, the health care worker must know how to use the metric system for liquid measure.

II. Presentation:

CONCEPT	CLASSROOM ACTIVITY
Liquid metric measure	Chalkboard Demonstration: Show how to add and subtract liquid measures using the metric system. Refer to Teacher Information Sheet.
	Transparency: Demonstrate how to fill out I & O chart.
Measuring and recording fluids in metric	Simulation: 1. Have students work in pairs. 2. Have one student act as a patient, and place tap water in bed pan as substitute for urine. 3. Pour urine into graduated pitcher. 4. Measure and record on I & O chart.

II. Presentation:

CONCEPT	CLASSROOM ACTIVITY
Measuring and recording fluids in metric (continued)	5. Rinse the graduated pitcher and bed pan with cold water (prevents coagulation of bacteria on equipment). 6. Clean pitcher and bed pan and return to storage area. A similar simulation can be done with fluid intake by measuring all the fluids taken in with a graduated measuring cup or beaker. First measure all of the liquid given to the patient. After the patient has finished eating, measure liquids left; subtract from the original amount to find the actual fluid intake. For example: Tea cup capacity 120 cc. Amount of tea left -30 cc. Actual intake 90 cc.

III. Application:

Have students complete Skill Builders on the assignment sheet individually or in groups.

IV. Evaluation:

TEST - METRIC MEASURE

Directions:

Complete the following problems.

1. 2,368 liters = ____ kiloliters ____ hectoliters ____ dekaliters ____ liters

2. 659 liters = ____ kiloliters ____ hectoliters ____ dekaliters ____ liters

3. 1,420 liters = ____ kiloliters ____ hectoliters ____ dekaliters ____ liters

4.

Centiliters	Milliliters
4 + 9	8 + 9

Liters	Centiliters
5 + 9	9 + 6

ASSIGNMENT SHEET

Math Concept: Metric Measure - Liquid

Task: Measure and Record Patient Intake and Output

Why learn this?

It is important to keep the body in fluid balance. This means fluids taken in should equal fluids removed. During times of illness the body might not remain in fluid balance. It may become necessary for the health care worker to measure the intake and output to determine whether or not the patient is in fluid balance.

Principle Emphasized: Metric measurement of liquids

Words to Know:

Dehydration
Edema
Equivalent
Fluid Balance
Intake
Output
Perspiration
Profuse
Retained
Urine

Resources: Information Sheet - Measuring Intake and Output

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1. Read the resource
2. Complete Skill Builder - Words to Know
3. Complete Skill Builder - Recording Patient Input and Output
4. Complete Skill Builder - Converting Standard Measure to Metric Measure

INFORMATION SHEET

MEASURING INTAKE AND OUTPUT

Fluid Intake: Fluids are taken in by mouth, through the veins (intravenous), and through medications.

Fluid Output: Fluid is lost through urine, feces, vomiting, diarrhea, hemorrhage, or profuse sweating.

When the body's intake of fluids equals its output, the body is in fluid balance. Fluid not absorbed by the body is lost through urine and perspiration. Through eating and drinking the body takes in about 3 1/2 quarts of fluid each day. When fluid is retained by the body during some type of illness or any other medical reason it is called edema. Excessive loss of fluid may be the result of vomiting, diarrhea, hemorrhage, and profuse sweating. When there is an excessive loss of fluid by the body, it is called dehydration. The only way a doctor can determine if there is an imbalance in the patient's fluid intake and output is by knowing the measurable intake and output. Therefore, it is very important that the health aide record this information accurately.

Measuring Fluids

The metric system is most often used for measuring fluids. For this reason it is important to understand the term cc. This term is an abbreviation for cubic centimeter, a unit of measure in the metric system. The following is a table of metric equivalents that you, as a health aide, should be familiar with.

U.S.		METRIC
1/4 teaspoon	=	1 cc.
1 teaspoon	=	4 cc.
1 ounce	=	30 cc.
1 cup	=	240 cc.
1 pint	=	480 cc.
1 quart	=	960 cc.

Intake and output (I & O) is required for patients who are receiving intravenous fluids and who have urinary catheters. Catheters are used to guide urine from the bladder into a collection bag where it can be measured.

The doctor must know as accurately as possible how much fluid the patient has taken in and lost to help diagnose the illness or plan treatment.

See Chapter 9 in Hospital Research and Educational Trust, Being a Nursing Aide (Bowie, Maryland: Robert J. Brady Company, 1975).

Grace V. Hornemann, Basic Nursing Procedures (Albany, NY: Delmar Publishers, 1980), pp. 73-75.

SKILL BUILDER

WORDS TO KNOW

Directions:

- Using the information sheet provided on intake and output, put the following words into original sentences.

1. Dehydration ______________________________

____

2. Edema ______________________________

____

3. Equivalent ______________________________

____

4. Fluid Balance ______________________________

____

5. Intake ______________________________

____

6. Output ______________________________

____

7. Perspiration ______________________________

____

8. Profuse ______________________________

____

9. Retained ______________________________

____

10. Urine ______________________________

____

SKILL BUILDER

RECORDING PATIENT INTAKE AND OUTPUT

Directions:

a. Record the patient described below on the Intake/Output chart.

Patient: Bill Jones was in Room 201B on March 4. His intake and output were measured for a 24 hour period. His intake was as follows: 6:00 a.m. - 240 cc. of coffee, 9:30 a.m. - 150 cc. milk, 11:30 a.m. - 480 cc. soup, 3:00 p.m. - 100 cc. water, 5:00 p.m. - 600 cc. milk and juice, 9:00 p.m. - 400 cc. coke.

Bill's output was: 6:30 a.m. - 400 cc. urine, 9:00 a.m. - 250 cc. liquid stool, 2:00 p.m. - 150 cc. urine, 3:00 p.m. - 50 cc. vomit, 7:00 p.m. - 500 cc. urine, 10:00 p.m. - 250 cc. urine.

b. Upon completion of the I & O chart, add all the fluid intake and fluid output and evaluate to see if the patient, Bill Jones, was in fluid balance as described in the information sheet on fluid intake and output.

TRANSPARENCY - RECORDING PATIENT INTAKE AND OUTPUT

Patient's Name Smith, J. Room 511 B

INTAKE					OUTPUT			
DATE	TIME	METHOD OF ADMINISTRATION	SOLUTION	AMOUNT CC.'s RECEIVED	TIME	CC. URINE AMOUNT	OTHER	
							KIND	AMOUNT
4/15	7 a.m.	p.o.	Milk Coffee	540	6:00 a.m.	500	Liq. Stool	100
	10:15 a.m.	I.V.	D/W	840	11:00 a.m.	400		
	12:00 noon	p.o.	Soup Ice Tea	480	4:00 p.m.	700	Vomit	20
	3:00 p.m.	p.o.	Water	60	7:00 p.m.	300		
	5:00 p.m.	p.o.	Milk Juice	645	10:30 p.m.	600		
	9:00 p.m.	p.o.	Coke Water	120				

Key: p.o. = oral or by mouth
I.V. = intravenous
T.F. = tube feeding
cc. = cubic centimeters

INTAKE AND OUTPUT CHART

Patient's Name ______________________________ Room ________________

INTAKE					OUTPUT			
DATE	TIME	METHOD OF ADMINISTRATION	SOLUTION	AMOUNT CC.'s RECEIVED	TIME	CC. URINE AMOUNT	OTHER	
							KIND	AMOUNT

Key: p.o. = oral or by mouth
I.V. = intravenous
T.F. = tube feeding
cc. = cubic centimeters

SKILL BUILDER

CONVERTING STANDARD MEASURE
TO METRIC MEASURE

Directions:

Using the metric equivalent chart found on the information sheet, calculate the number of cc's the patient has consumed in the example below. Use space provided to compute answer.

The patient, Mary Jones, had the following fluids on January 18:

9:00 a.m.	4 oz. tea 2 oz. juice
11:30 a.m.	2 cups of soup 1/2 cup water
3:00 p.m.	1 cup coke
5:00 p.m.	1/2 pint ice cream (Anything that is liquid at room temperature is considered a fluid) 1/2 cup tea 1 cup soup
9:00 p.m.	1/2 cup jello 4 oz. tea

The total number of cc's for the day is ____________________.

answer: 1,860 cc.

a bird's eye view

COUNTING AND RECORDING VITAL SIGNS

Understand this math concept:

Standardized measurements of body function are used to indicate human wellness or illness.

Teacher Materials
Information Sheet
Sample Lesson Plan

Student Materials

Assignment Sheet:	Count and Record Vital Signs
Information Sheet:	Vital Signs
Skill Builders:	Words to Know Patient Records

TEACHER INFORMATION SHEET

Understand this math concept:

Standardized measurements of body function are used to indicate human wellness or illness.

A thermometer is an instrument used to measure the temperature of liquids, gases, or solids. Temperature scales used on thermometers include the Fahrenheit scale and the Centigrade scale.

Centigrade Scale (Celsius)

The Centigrade scale has 100 divisions between the freezing and boiling points of water. Freezing is 0°C and boiling is 100°C. The metric units of temperature are degrees Celsius. Normal body temperature is 37.0° C.

Fahrenheit Scale

The Fahrenheit scale has 180 divisions between the freezing and boiling points of water. Freezing is 32°F and boiling is 212°F.

Normal body temperature is 98.6°F.

SAMPLE LESSON PLAN

Math Concept: Count, Add, Multiply, Graph
Task: Count and Record Vital Signs

Objective: The student will be able to:

1. Read and record temperature using a Celsius and Fahrenheit thermometer
2. Take and record vital signs
3. Collect and display data on a graph

Teaching Aids:

- Thermometers (Fahrenheit and Celsius)
- Tissue or Cotton Balls
- Daily Record Charts for Entire Class
- Pen or Pencil
- Watch with a Second Hand
- Blood Pressure Cuff
- Stethoscope
- Alcohol or Disinfectant
- Graph Paper

I. Preparation of the Learner:

Temperature is one of the vital signs used to indicate the health of a patient. It is important that the aide know how to read the thermometer correctly to make accurate observations of a patient.

II. Presentation:

CONCEPT	CLASSROOM ACTIVITIES
Celsius and Fahrenheit thermometers	Get a Fahrenheit and Celsius thermometer. Are the thermometer scales marked off in ten degree units? Place the thermometers in liquids of varying temperatures. Read the temperatures. Discuss the differences between Celsius and Fahrenheit thermometers.
Plotting data on graph paper	Have the students take their temperature daily using both the Celsius and Fahrenheit thermometers. Plot each on graph paper.
Taking and recording vital signs	Have students work in pairs: one student is the nurse's aide and one is the patient. Each student will take three other students' TPR's and BP's. Record them along with the time and date taken on the daily record chart. After this is done, reverse roles.

II. Presentation:

CONCEPT	CLASSROOM ACTIVITIES
	Invite members of another class to make appointments to have their vital signs taken. Have one student be the secretary and send an invitation to the class chosen. Attach an appointment sheet of desired times. This will give the students additional people to practice on and to record on the daily record chart.

III. Application:

Have the students individually complete the Skill Builders on the student assignment sheet.

DAILY RECORD CHART

NAME	DATE	TIME	T	P	R	BP	COMMENTS

ASSIGNMENT SHEET

Math Concept: Count, Add, Multiply, Graph

Task: Count and Record Vital Signs

Why learn this?

When the body is not functioning properly, the measurable rates of the vital signs are often different from the normal rates. These rates must be taken and be carefully recorded in a systematic, accurate way, so that the doctor can use them to diagnose the ailment and prescribe treatment for the patient.

Principle Emphasized:

Standardized measurements of body function are used to indicate human wellness or illness.

Words to Know:

Arteries
Blood
Circulation
Contraction
Diagnose
Expansion
Graphic Chart
Measure
Prescribe
Respiration

Resources: Information Sheet - Vital Signs

---

1. Read the resources.
2. Complete Skill Builder - Words to Know
3. Complete Skill Builder - Patient Records

INFORMATION SHEET

VITAL SIGNS

Temperature:	Heat produced in the body as a result of body activity.
Pulse:	The expansion and contraction of an artery caused by the contraction of the heart forcing blood through the arteries.
Respiration:	How often a person breathes in and out taking in oxygen (O_2), and removing carbon dioxide (CO_2).
Blood Pressure:	The force of the blood against the walls of the blood vessels.

There are four major functions that can be measured and recorded during a patient's illness that help the doctor understand the patient's condition. They are called the vital signs. The word "vital" means full of life and very important. The four vital signs are temperature, pulse, respiration, and blood pressure.

These vital signs are closely related to the body's circulatory and respiratory systems. In normal, healthy persons, the body temperature, pulse, respiration, and blood pressure stay pretty close to the same rates. These are called normal rates. The rates for infants and children are different than rates for adults.

A patient's temperature, pulse, and respiration are usually taken at the same time and are called taking a patient's "TPR." When a patient's readings are normal they are only taken once a day. When rates are not normal, a "TPR" may be taken several times a day.

Blood pressure is the force of the blood pushing against the walls of the blood vessels. When you take a patient's blood pressure ("BP"), you are measuring this force of the blood flowing through the vessels. The amount of pressure in the arteries depends on the rate of heartbeat and how easily the blood flows through the blood vessels.

The nurse's aide takes and records the "TPR" and "BP" on a daily record chart. Then it is transferred to a graphic chart which is made by connecting each reading by a line. These lines make a picture that tells the doctor at a glance if the "TPR" or "BP" rate has changed drastically.

See Chapter 10 in Hospital Research and Educational Trust, Being a Nursing Aide (Bowie, Maryland: Robert J. Brady Company, 1975).

American Red Cross, Home Nursing (New York: Doubleday and Company, 1979).

Grace V. Hornemann, Basic Nursing Procedures (Albany, NY: Delmar Publishers, 1980), pp. 73.

SKILL BUILDER

WORDS TO KNOW

Directions:

Using the information sheet, write the correct word in the blank by the definition.

1. Arteries
2. Blood
3. Circulation
4. Contraction
5. Diagnose
6. Expansion
7. Graphic Chart
8. Measure
9. Prescribe
10. Respiration

1. ______________________________ is blood moving through blood vessels.

2. ______________________________ refers to shrinking.

3. ______________________________ is to make larger.

4. ______________________________ are tubes carrying blood from the heart.

5. ______________________________ is red fluid found in arteries and veins.

6. ______________________________ is when a doctor identifies a disease.

7. ______________________________ is used to record "TPR" and "BP."

8. ______________________________ is breathing.

9. ______________________________ is to order or take a medicine or treatment.

10. ______________________________ is to define a quantity or certain amount.

SKILL BUILDER

PATIENT RECORDS

Directions:

Using the Daily Record Chart, record the following patients' "TPR's" and "BP's."

1. J. R. Loe had a temperature of 99.2, a respiration of 12, and a pulse of 80. His blood pressure was 125/82. Date 7-5-83 Time 11:00 a.m.

2. L. M. Johnson had a temperature of 101.3, a respiration of 14, and a pulse of 75. Her blood pressure was 140/90. Date 7-5-83 Time 12:30 p.m.

3. T. P. Black had a temperature of 102.6, a respiration of 11, and a pulse of 72. His blood pressure was 120/80. Date 7-5-83 Time 1:00 p.m.

a bird's eye view

DETERMINING COST OF YARDGOODS

Understand this math concept:

Multiplying mixed number fractions and decimal fractions

Teacher Materials
Information Sheet
Sample Lesson Plan

Student Materials
Assignment Sheet: Determining Cost of Yardgoods
Information Sheet: Determining Cost of Yardgoods
Skill Builders: Number Talk
Multiplication of Fractions
Multiplication of Decimal Fractions

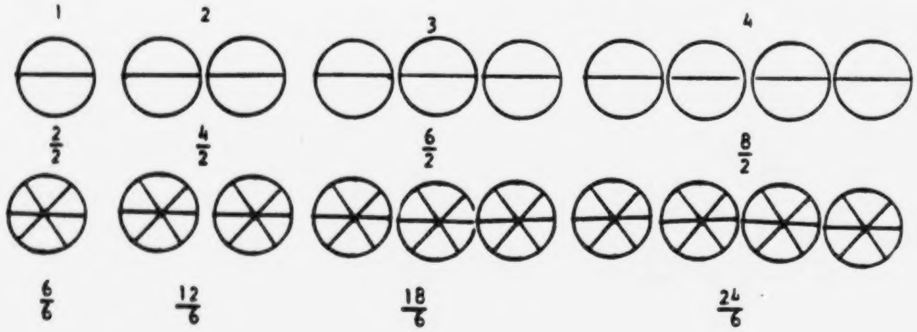
TEACHER INFORMATION SHEET

Understand this math concept:

Multiplying mixed number fractions and decimal fractions

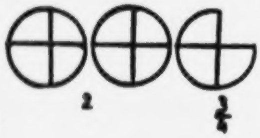
To Convert Mixed Numbers To Improper Fractions

Whole Numbers to Fractions



Mixed Numbers to Improper Fractions

2 3/4



2 = whole number

3 = numerator
4 = denominator

Method: Whole number x denominator + numerator

$$\frac{4}{4} + \frac{4}{4} + \frac{3}{4} = \frac{11}{4} \quad \text{OR} \quad 2 \times 4 + 3 = \frac{11}{4}$$

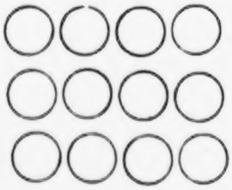
To Multiply A Fraction

$\frac{1}{2} \times \frac{3}{5} = \frac{1 \times 3 = 3}{2 \times 5 = 10}$ OR $\frac{1}{2} \times \frac{3}{5} = \frac{3}{10}$

$\frac{2}{3} \times \frac{4}{7} = \frac{8}{21}$ $\frac{1}{4} \times \frac{1}{5} = \frac{1}{20}$ $\frac{1}{8} \times \frac{3}{4} = \frac{3}{32}$

To Multiply A Whole Number By A Fractional Number

3/4 of 12 =



Rename The Whole Number As A Fractional Number:

$3/4 \times 12 = \frac{3}{4} \times \frac{12}{1} = \frac{36}{4} = 9$

$1/4 \times 32 = \frac{1}{4} \times \frac{32}{1} = \frac{32}{4} = 8$

$2/3 \times 150 = \frac{2}{3} \times \frac{150}{1} = \frac{300}{3} = 100$

To Multiply A Mixed Number

$2 \times 5\frac{5}{6} = ?$

Rename The Mixed Number As An Improper Fraction:

$\left[\frac{5}{1} \times \frac{6}{6} = \frac{30}{6} + \frac{5}{6} = \frac{35}{6}\right]$

Multiply Numerators And Denominators:

$\frac{\text{Numerators}}{\text{Denominators}} \quad \frac{2}{5} \times \frac{35}{6} = \frac{70}{30}$

Write The Fraction In Its Lowest Reduced Terms:

$\frac{70}{30} = 2\ \frac{10}{30} = 2\ \frac{1}{3}$

Multiplication Of Decimal Numbers

To Multiply With Tenths:

$$.3 \times 6 = \frac{3}{10} \times 6 = \frac{18}{10} \ \underline{\text{OR}} \ 1\frac{8}{10} \ \underline{\text{OR}} \ 1.8 \text{ (product)}$$

Notice where the decimal is placed in the product

$$\begin{array}{r} 5 \\ \times\ \underline{.6} \\ 3.0 \end{array} \quad \begin{array}{r} 3 \\ \times\ \underline{.7} \\ 2.1 \end{array} \quad \begin{array}{r} 22 \\ \times\ \underline{.4} \\ 8.8 \end{array} \quad \begin{array}{r} 6 \\ \times\ \underline{.6} \\ 3.6 \end{array} \quad \begin{array}{r} 3.2 \\ \times\ \underline{12} \\ \underline{6\ 4} \\ \underline{32} \\ 38.4 \end{array}$$

To Multiply With Hundredths:

$$\begin{array}{r} 71 \\ \times\ \underline{.09} \\ 6.39 \end{array} \quad \underline{\text{OR}} \quad \frac{9}{100} \times \frac{71}{1} = \frac{639}{100} = 6.39 \text{ (product)}$$

Notice where the decimal is placed in the product

$$\begin{array}{r} 15 \\ \times\ \underline{.10} \\ 1.50 \end{array} \quad \begin{array}{r} 96 \\ \times\ \underline{.11} \\ 96 \\ \underline{96} \\ 10.56 \end{array} \quad \begin{array}{r} 76 \\ \times\ \underline{.41} \\ 76 \\ \underline{304} \\ 31.16 \end{array} \quad \begin{array}{r} 1.21 \\ \times\ \underline{6} \\ 7.26 \end{array} \quad \begin{array}{r} 4.32 \\ \times\ \underline{9} \\ 38.88 \end{array} \quad \begin{array}{r} 213 \\ \underline{.09} \\ 19.17 \end{array}$$

SAMPLE LESSON PLAN

Math Concept: Multiplying Fractions, Decimal Fractions, and Mixed Numbers
Task: Determine Cost of Yardgoods

Objective: The student will be able to:

1. Rewrite mixed numbers as fractions.
2. Multiply fractions
3. Multiply decimal fractions
4. Compute the cost of yardage using three different methods.

Teaching Aids:

Chalkboard
Chalk
Flashcards

I. Preparation of the Learner:

Working with fabric requires the salesperson to determine fabric costs with accuracy. This lesson will help you become skilled in computing fabric costs.

II. Presentation:

CONCEPT	CLASSROOM ACTIVITY
Rewriting mixed numbers as fractions	Make up flashcards with mixed numbers on one side and the correct improper fractions on the back. Students can practice converting and memorizing with each other or individually. This will help them change mixed fractions to improper fractions.
Multiplication of fractions	Chalkboard Talk: Use Teacher Information and Student Information Sheets.
Multiplication of mixed numbers	
Multiplication of decimal fractions	

III. Application:

Have students complete Skill Builders on Student Assignment Sheet individually.

IV. Evaluation

TEST - COST OF YARDGOODS

Directions:

Practice computing the cost of fabric by completing the following problems.

1. 6 yards fabric at $.99 yard = __________
2. 7 yards fabric at $1.29 yard = __________
3. 12 yards fabric at $6.29 yard = __________
4. 2 1/2 yards fabric at $1.29 yard = __________
5. 6 3/4 yards fabric at $6.58 yard = __________
6. 10 3/8 yards fabric at $3.29 yard = __________
7. 11 1/5 yards fabric at $2.18 yard = __________
8. 16 yards fabric at $6.98 yard = __________
9. 1/3 yard fabric at $9.48 yard = __________
10. 1 1/16 yards fabric at $1.83 yard = __________

ASSIGNMENT SHEET

Math Concept: Multiplying Fractions, Decimal Fractions, and Mixed Numbers

Task: Determine Cost of Yardgoods

Why learn this?

Whether you are slipcovering a chair, making draperies, tailoring a jacket, or selling fabric in a store, you will need to be able to compute the total cost of the yardgoods needed for the job.

Principle Emphasized: Multiplying mixed number fractions and decimal fractions

Words to Know:

Whole Number
Mixed Numbers
Numerator
Denominator
Improper Fraction
Fraction
Decimal Fraction
Yard

Resources: Information Sheets: Determining Cost of Yardgoods

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1. Read the information sheet
2. Complete Skill Builder - Words to Know
3. Complete Skill Builder - Multiplying Fractions
4. Complete Skill Builder - Multiplying Decimal Fractions

Calculating Yardage Cost by Multiplication of Fractions

If you are employed in a fabric store that does not have a yardage counter machine, it would be important for you to know how to figure yardage costs. To figure yard costs, multiply the number of yards needed by the price per yard. For example, if a customer wanted 4 yards of corduroy at $2.99 a yard, what would be the total cost of the yardage?

$$\begin{array}{rl} \$2.99 & \text{cost per yard} \\ \underline{\times\ \ 4} & \text{number of yards} \\ \$11.96 & \text{total cost per yardage} \end{array}$$

Now, let's try a harder problem. If a customer wanted 4 1/8 yards of corduroy at $2.99 a yard, what would be the total cost of the yardage? This problem involves a fraction so we have to know about multiplying with fractions. A numeral in a form such as 1/8 is a fraction. The numeral above the horizontal line is the numerator . The numeral below the line is the denominator.

$\$2.99 \times 4\ 1/8$ $\qquad \begin{array}{ll} \underline{1} & \text{numerator} \\ 8 & \text{denominator} \end{array}$

When multiplying a whole number by a mixed number (a whole number mixed with a fractional part), it is necessary to change the mixed number to an improper fraction. An improper fraction is a fraction whose numerator is larger than its denominator and whose value is greater than a whole unit. If, for example, 4 1/8 is expressed as an improper fraction, it would be expressed as $\frac{33}{8}$.

To change a mixed number to an improper fraction, (1) multiply the denominator by the whole number, (2) add the numerator to the total, (3) put your answer over the denominator you began with.

4 1/8 (1) $8 \times 4 = 32$ (2) $32 + 1 = 33$ (3) $\frac{33}{8}$

Step 1: Place the whole number $2.99 over "1" $\qquad \frac{\$2.99}{1} \times 4\ 1/8$

Step 2: Change 4 1/8 to an improper fraction $\qquad 4 \times 8 = 32 + 1 = \frac{33}{8}$

Step 3: Multiply across the times sign

a)
b) $\frac{\$2.99}{1} \times \frac{33}{8} = \frac{\$98.67}{8}$ OR: a) $\begin{array}{r} \$2.99 \\ \underline{\times\ 33} \\ 8\ 97 \\ \underline{89\ 7\ \ } \\ \$98.67 \end{array}$ b) $\begin{array}{r} 8 \\ \times \frac{1}{8} \end{array}$

Step 4: Divide the numerator by the denominator

$$\begin{array}{r} 12.33 \\ 8\,\overline{)\,98.67} \\ -8 \\ \hline 18 \\ -16 \\ \hline 2\,6 \\ -\;2\,4 \\ \hline 27 \\ -24 \\ \hline 3^{*} \end{array}$$

*If this figure is more than half of 8, round off the answer to the next number, or 12.34 instead of 12.33.

Answer: If a customer purchased 4 1/8 yards of corduroy at $2.99 a yard, the total cost of the yardage is $12.33.

SKILL BUILDER

NUMBER TALK

Using the vocabulary listed on the left, identify the following examples by writing the word or words in the blanks provided:

1. yard   1/16   a.______________________

2. whole number   ①/2   b.______________________

3. fraction   1/②   c.______________________

4. mixed number   4 1/2   d.______________________

5. improper fraction   36/4   e.______________________

6. decimal fraction   6   f.______________________

7. numerator   6.25   g.______________________

8. denominator   36   h.______________________

SKILL BUILDER

MULTIPLICATION OF FRACTIONS

A. Circle the following numbers which are mixed numbers.

5/8 4 1/4 3 5/8 7 2/3

6 3/8 6/7 2 7/8 8

2 1/2 3 5/9

B. Circle the following numbers which are improper fractions.

5/8 3/5 3 5/8 7 1/3

9/8 5/3 22/3 4/3

2 1/2 1/2 7/6 1/3

C. Convert the following mixed numbers to improper fractions.

1. $7\frac{1}{2}$ 2. $6\frac{5}{8}$ 3. $3\frac{2}{3}$

4. $9\frac{1}{7}$ 5. $4\frac{1}{5}$ 6. $4\frac{1}{8}$

SKILL BUILDER

MULTIPLICATION OF DECIMAL FRACTIONS

I. Compute the total cost of the yardgoods; be sure to show all your calculations:

1. ______ 3 1/8 yards velveteen at $3.49 per yard.

2. ______ 4 1/2 yards broadcloth at $1.35 per yard.

3. ______ 5 3/4 yards muslin at $1.69 per yard.

4. ______ 8 yards interfacing at $.79 per yard.

5. ______ 5 7/8 velvet at $6.99 per yard.

6. ______ 2 3/8 yards jersey at $2.99 per yard.

7. ______ 4 1/8 yards polyester at $2.50 per yard.

8. ______ 9 3/4 yards cotton at $3.99 per yard.

II. Work the following problems on computing cost of yardage. 1) Use improper fraction method on problems starred with an asterisk (*), and 2) use the decimal equivalent method on the other problems. Be sure to show all your calculations.

1. ______ 2 1/2 yards denim at $2.99 a yard.

* 2. ______ 5 1/8 yards linen at $5.99 yard.

3. ________ 10 1/2 yards polyester at $1.99 per yard.

*4. ________ 15 1/2 yards upholstery fabric at $6.99 per yard.

5. ________ 3 7/8 yards cotton fabric at $2.59 per yard.

*6. ________ 4 3/4 yards antique satin at $3.99 per yard.

7. ________ 7 5/8 yards gaberdine at $4.59 per yard.

*8. ________ 21 1/4 yards drapery fabric at $4.99 per yard.

9. ________ 6 3/8 yards wool at $9.99 per yard.

*10. ________ 2 7/8 yards lining at $2.79 per yard.

11. ________ 14 3/8 yards silk at $19.49 per yard.

Calculating Yardage Cost by Multiplication of Decimal Fractions

Another method for determining the total cost of yardgoods is *to replace the fraction with a decimal equivalent.*

Decimal fractions refer to those fractions which are expressed with denominators of 10 or powers of 10.

All fabrics in a fabric store are sold in eighths of a yard.

* 1/8 = .125
2/8 or 1/4 yard = .25
3/8 = .375
4/8 or 1/2 yard = .50
5/8 = .625
6/8 or 3/4 yard = .75
7/8 = .875
8/8 or 1 yard = 1.

$$\text{* Process} = \begin{array}{r} 1.25 \\ 8\,\overline{)\,1.00} \\ -\underline{8} \\ 20 \\ -\underline{16} \\ 40 \\ \underline{40} \end{array}$$

Divide the numerator by the denominator

For example: 3 5/8 yards would read 3.625 OR
7 7/8 yards would read 7.875

Insert the decimal equivalents of the following fractions in the problems below:

16 1/2 =
22 3/4 =
13 7/8 =
35 1/4 =
5 5/8 =
2 1/8 =
7 3/8 =

To determine the cost of yardage by using decimals, replace the fraction in the problem with the decimal equivalent and then multiply the numbers.

For example: 2 5/8 yards x $1.99 =
2.625 x $1.99 = $5.22

ANSWER SHEET

SKILL BUILDER: Number Talk

a. 3
b. 7
c. 8
d. 4
e. 5
f. 2
g. 6
h. 1

SKILL BUILDER: Circle the Mixed Numbers

A.

5/8	[✓ 4 1/4]	[✓ 3 5/8]	[✓ 7 2/3]
[✓ 6 3/8]	6/7	[✓ 2 7/8]	8
2	1/2	3	5/9

Circle the Improper Fractions

B.

5/8	3/5	3 5/8	7 1/3
[✓ 9/8]	[✓ 5/3]	[✓ 22/3]	[✓ 4/3]
2 1/2	1/2	[✓ 7/6]	1/3

Convert the Following Mixed Numbers to Improper Fractions

C.

	process			answer
1.	7 1/2	7 × 2 = 14	14 + 1 = 15	15/2
2.	6 5/8	6 × 8 = 48	48 + 5 = 53	53/8
3.	3 2/3	3 × 3 = 9	9 + 2 = 11	11/3
4.	9 1/7	9 × 7 = 63	63 + 1 = 64	64/7
5.	4 1/5	4 × 5 = 20	20 + 1 = 21	21/5
6.	4 1/8	4 × 8 = 32	32 + 1 = 33	33/8

SKILL BUILDER: Multiplication of Decimal Fractions

I.

1. $10.91
2. 6.08
3. 9.72
4. 6.32
5. 41.06
6. $ 7.10
7. 10.31
8. 38.90

SKILL BUILDER: Computing Cost of Yardage

II.

1.	$ 7.48	7.	$ 35.00
2.	30.70	8.	106.04
3.	20.90	9.	63.69
4.	108.35	10.	8.02
5.	10.04	11.	280.17
6.	18.95		

a bird's eye view

DETERMINING EQUIVALENT LIQUID VOLUME MEASURES

Understand this math concept:

Standardized methods and utensils are used to measure food volume in preparation and portioning

Teacher Materials
Information Sheet
Sample Lesson Plan

Student Materials
Assignment Sheet: Determine Equivalent Liquid Volume Measures
Information Sheets: Measuring Liquid
Standard Size Scoop And Ladle
Skill Builders: Words to Know
Determining Equivalent Volume Measurements
Sizing-Up A Can
Using Scoops And Ladles

TEACHER INFORMATION SHEET

Understand this math concept:

Standardized methods and utensils are used to measure food volume in preparation and portioning

Food service units feed hundreds or thousands of people at one meal. When food is prepared in such large quantities, it is necessary to use standarized recipes to achieve the same results each time a recipe is prepared. Standardized recipes demand standardized measuring utensils which measure the ingredients by volume and by weight. In food preparation, liquids are measured by volume.

Cups, pints, quarts, and gallons are standard units of measure in the English system. Smaller volume measurements are teaspoons and tablespoons.

The standard liquid measuring cup is 1/2 pint or 8 ounces. Subdivisions are marked on the cup for measuring 1/4, 1/2, 3/4, 1/3 and 2/3 of a cup. Most cups do not show smaller subdivisions. Liquid measuring utensils are those that have the rim above the full mark and have a pour lip to facilitate emptying the utensil. It is best if it is transparent so it can be read at eye level.

Smaller volume measurements are tablespoons and teaspoons. They come in sets which measure 1 tablespoon, 1 teaspoon, 1/2 teaspoon, and 1/4 teaspoon. To test for accuracy, they should be checked against a standard cup - 16 level tablespoons are required to fill one cup, and 3 level teaspoons are equal to 1 level tablespoon.

Volume Measurements

3 teaspoons = 1 tablespoon
16 tablespoons = 1 cup
4 tablespoons = 1/4 cup
8 tablespoons = 1/2 cup
12 tablespoons = 3/4 cup
5 1/3 tablespoons = 1/3 cup

2 cups = 1 pint
4 cups = 1 quart
4 quarts = 1 gallon
2 tablespoons = 1 liquid ounce (or 1/8 cup)
8 fluid ounces= 1 cup (or 1/2 pint)

Some recipes will designate volume by can size.

8 ounces = 1 cup
No. 300 = 1 3/4 cup
No. 1 Tall = 2 cups
No. 303 = 2 cups
No. 2 = 2 1/2 cups
No. 2 1/2 = 3 1/2 cups
No. 3 = 4 cups
No. 5 = 7 1/3 cups
No. 10 = 13 cups

Standard Portions

Standard portions means that everyone receives exactly the same size serving. In order to standardize serving sizes, foods are served with scoops or ladles. Each size scoop holds a portion of a cup. The higher the number of the scoop, the smaller the volume it holds.

No. 6 = 2/3 cup
No. 8 = 1/2 cup
No. 10 = 2/5 cup
No. 12 = 1/3 cup
No. 16 = 1/4 cup
No. 20 = 3 1/5 tablespoons
No. 30 = 2 1/5 tablespoons
No. 60 = 1 tablespoon

SAMPLE LESSON PLAN

Math Concept: Volume Measurements
Task: Determine Equivalent Volume Measurements

Objective: The student will be able to:

1. Measure liquids in teaspoons, tablespoons, cups, portions of cups, pints, quarts, and gallons.
2. State the capacity of a given measure in terms of other units.

Teaching Aids:

Measuring Utensils
  Gallon
  Quart
  Pint
  Cup
  Set of Teaspoons
  Set of Tablespoons

Colored Water
Cans of Various Sizes
  Numbers 300, 1, 2, 2 1/2, 3, 5 and 10
Scoops and Ladles

I. Preparation of the Learner:

Food preparation success depends upon the proportions of ingredients used and upon the techniques of mixing and cooking. Careful and correct measuring techniques are essential for consistent success.

II. Presentation:

CONTENT	CLASSROOM ACTIVITIES
Volume measuring utensils	Display volume measuring utensils. - Graduated teaspoons - A tablespoon measuring tool - Liquid measuring cups in 1, 2, and 4 cup capacity - A pint measure - A quart measure - A gallon measure
Using liquid volume measuring utensils	Demonstration: Liquids are measured in a graduated utensil at eye level by putting a cup on a flat level surface. Liquid is poured into the utensil until the liquid reaches the desired mark.
Equivalents in volume measure	Demonstration: Using colored water, show volume equivalents.
Can sizes	Display various can sizes.
Scoops and ladles	Display scoops and ladles.

III. Application:

Using the assignment sheet, have students complete the Skill Builder activities individually or in groups.

IV. Evaluation:

TEST - LIQUID MEASURE

Directions:

a. Fill in the blanks with the equivalent, using the least number of measuring utensils.

1. 6 teaspoons ____________
2. 4 tablespoons ____________
3. 6 tablespoons ____________
4. 20 tablespoons ____________
5. 5 1/3 tablespoons ____________
6. 2 cups ____________
7. 32 cups ____________
8. 4 pints ____________

b. Match the can size with the liquid volume.

CAN SIZE	LIQUID VOLUME
_____ No. 10	a. 8 cups
_____ No. 3	b. 1 3/4 cups
_____ No. 2	c. 2 cups
_____ No. 2 1/2	d. 13 cups
_____ No. 5	e. 7 1/3 cups
_____ No. 1 Tall	f. 4 cups
_____ No. 300	g. 3 1/2 cups
	h. 2 1/2 cups

ASSIGNMENT SHEET

Math Concept: Volume Measurements
Task: Determine Equivalent Volume Measurements

Why learn this?

It is true that some successful chefs do not measure or weigh their ingredients in the usual way. However, for consistent results, it is best to use standardized recipes and accurate measurements. This will insure a quality product.

Principle Emphasized:

Standardized methods and utensils are used to measure food volume in preparation and portioning

Words to Know:

Consistent
Gallon
Pint
Quart
Standardized
Volume

Resources: Information Sheet - Measuring Liquids
Information Sheet - Standard Size Scoops and Ladles

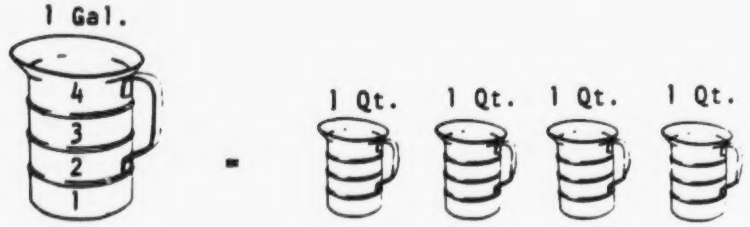
---

1. Read the resources
2. Complete Skill Builder - Words to Know
3. Complete Skill Builder - Determining Equivalent Volume Measurements
4. Complete Skill Builder - Sizing-Up A Can
5. Complete Skill Builder - Using Scoops and Ladles

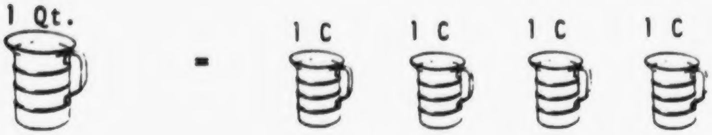
INFORMATION SHEET

MEASURING LIQUIDS

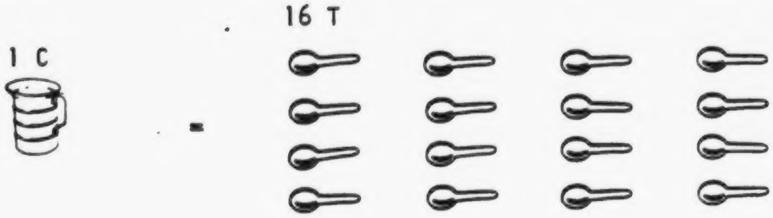
1 Gal. = 4 Qt.


1 Gal.
4
3
2
1
=
1 Qt.
1 Qt.
1 Qt.
1 Qt.

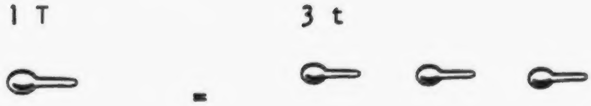
1 Qt. = 4 C


1 Qt.
=
1 C
1 C
1 C
1 C

1 C = 16 T



1 T = 3 t



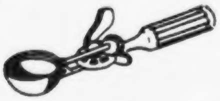
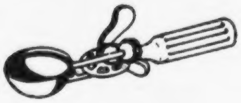
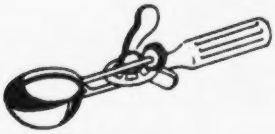
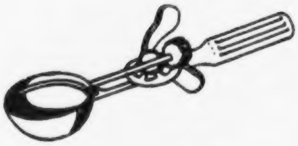
Pints, Quarts, Gallons

2 C = 1 Pt.
2 Pt. = 1 Qt.
4 Qt. = 1 Gal.

INFORMATION SHEET

STANDARD SIZE SCOOPS AND LADELS

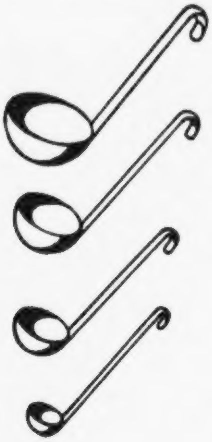
Standard size scoops most commonly used in food service operations are:

Scoop No.		Measure	Weight	Suggested Use
24		2-2/3 T.	1-1/2 to 1-3/4 oz.	Filling for Meat Roll, Cream Puffs
20		3 T.	1-3/4 to 2 oz.	Sandwich Filling Sauces
16		4 T. (1/4 C)	2 to 2 1/4 oz.	Fruit Cocktail Salads Cottage Cheese Potatoes, Rice Dressing
12		5 T. (1/3 C)	2-1/2 to 3 oz.	Pudding Croquettes Vegetables

Scoop Sizes

No. 24 No. 20 No. 16 No. 12

Standard size ladles most commonly used in food service operations are:



Ladle No.	Measure	Weight	Suggested Use
#4	1/2 C	4 oz.	Soups Casseroles Spaghetti
#3	1/3 C	3 oz.	Cereals Casseroles Meat Sauces
#2	1/4 C	2 oz.	Gravy
#1	1/8 C	1 oz.	Salad Dressings Sundae Sauces

SKILL BUILDER

WORDS TO KNOW

Directions:

After answering questions 1-6 below, find and circle your answers in the puzzle.

1. A two cup volume measure is a ________________________.

2. A two pint volume measure is a ________________________.

3. Space occupied by three dimensions is __________________.

4. A recipe calling for accurate measurements is ________________________.

5. A word meaning "always the same" is __________________.

6. A sixteen cup volume measure is a ______________________.

T O Q D E A C D O F T A L M O T U L J D M O K R
B Y U P F C F U L A M C T O F Y I R E X C J U Y
S G A L L O N Q S W A E C O R F O R H G D V B K
A U R O A N L O S T U K W E L O K P M V C H R D
M W T R S S T A N D A R D I Z E D P O L I K J Y
I K H I O I T N S N E O L I Z F S G B K W L L U
K C N H O S O F O N Z L L O E S W Q G H U I T T
A B T O L T U L Q T P S V O L M E P I Z O O L R
V O L U M E K S N P T I N S U A L I U Y E R S G
K C L A N N D E L T M N O L K F B N R O W E R P
A O B M S T O O N S K I S O G H C T Q P L K O F

SKILL BUILDER

DETERMINING EQUIVALENT VOLUME MEASURES

Directions:

Where there are blanks in the chart, complete them by computing the correct measurement and writing it or the correct term in the space. See Item 1 as an example.

	QUANTITY	UNIT		QUANTITY	UNIT
1.	EXAMPLE 1	C	=	16	T
2.	1/2	C	=	___	T
3.	___	___	=	3	t
4.	16	T	=	___	C
5.	1/4	C	=	___	T
6.	3	t	=	___	T
7.	1	C	=	___	Liq. oz
8.	1/2	C	=	___	Liq. oz
9.	___	C	=	2	Liq. oz
10.	1	Liq. oz	=	___	T
11.	___	Liq. oz	=	8	T
12.	4	Qt	=	___	Gal

	QUANTITY	UNIT		QUANTITY	UNIT
13.	____	Qt	=	1/2	Gal
14.	1	____	=	4	C
15.	1	Pt	=	____	Cups
16.	____	Pt	=	1	Qt
17.	1/2	Pt	=	____	C
18.	____	C	=	1	Qt
19.	____	C	=	1	Gal
20.	____	Liq. oz	=	1	Gal
21.	8	____	=	1	Gal
22.	____	T	=	1/2	C
23.	____	T	=	1/3	C
24.	____	T	=	7/8	C
25.	____	t	=	1	C

26. 8 Oz = ________ C = 16 ________

27. 2 C = 1 ________ = ________ Oz

28. 2 Pt = 1 ________ = ________ C

29. 2 Qt = ________ Gal = ________ C

30. 4 Qt = ________ Gal = ________ C

SKILL BUILDER

SIZING-UP A CAN

Directions:

Answer the following questions.

	VOLUME MEASURE		CAN SIZE
1.	13 cups	=	________
2.	3 1/2 cups	=	________
3.	4 cups	=	________
4.	2 cups	=	________
5.	7 1/3 cups	=	________
6.	2 1/2 cups	=	________
7.	1 3/4 cups	=	________

8. You are preparing spaghetti and need two gallons of tomato juice. Name the can sizes and the numbers of each you would buy to obtain the exact amount. ______________________________

____

____

9. You need one quart of cherry pie filling. You would purchase one no. __________ can.

10. You need 208 cups of orange juice. You would purchase ____________ ____.

SKILL BUILDER

USING SCOOPS AND LADLES

Directions:

I. Complete the chart by filling in the spaces with volume, weight, and suggested uses for the most commonly used scoop sizes.

	SCOOP NO.	VOLUME	WEIGHT	SUGGESTED USES
1.	60			
2.	30			
3.	20			
4.	16			
5.	12			
6.	10			
7.	8			
8.	6			

II. Complete the chart by filling in the spaces with volume, weight, and suggested uses for the most commonly used ladle sizes.

	LADLE NO.	VOLUME	WEIGHT	SUGGESTED USES
9.	1			
10.	2			
11.	4			
12.	6			
13.	8			

III. Complete the chart by filling in the spaces with the equivalent quantity or unit for each scoop size.

	SIZE NO.		QUANTITY	UNIT		QUANTITY	UNIT
	EXAMPLE 30	=	1/8	C	=	2	T
1.	12	=	1/3	____	=	5 1/3	____
2.	10	=	3	oz	=	____	T
3.	6	=	____	C	=	____	T
4.	60	=	____	C	=	____	T
5.	20	=	1/3	____	=	____	T
6.	16	=	1/4	____	=	4	____
7.	8	=	1/2	____	+	____	T

IV. Complete the chart by filling in the correct volume for each ladle size.

	SIZES	VOLUME
1.	#1	
2.	#2	
3.	#3	
4.	#4	

V. Complete the following questions and write the answers in the blanks.

1. How many #16 scoops in a quart? ______________________________
2. How many #8 ladles in a gallon? ______________________________
3. What is a #30 scoop used for? ______________________________
4. What are 4 oz ladles used for? ______________________________
5. What are 1 oz ladles used for? ______________________________
6. What size scoop is appropriate for dipping mashed potatoes? __________
7. What size ladle is appropriate for serving soups? ________________
8. Which scoop would yield the highest profit if ice cream were sold for the same price per scoop, #12 scoop or #16 scoop?

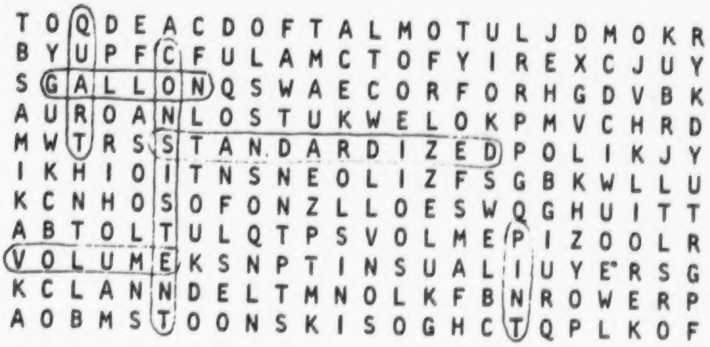
   ____

SKILL BUILDERS

ANSWER SHEET

Words to Know

1. Pint
2. Quart
3. Volume
4. Standardized
5. Consistent
6. Gallon



T	O	Q	D	E	A	C	D	O	F	T	A	L	M	O	T	U	L	J	D	M	O	K	R
B	Y	U	P	F	C	F	U	L	A	M	C	T	O	F	Y	I	R	E	X	C	J	U	Y
S	G	A	L	L	O	N	Q	S	W	A	E	C	O	R	F	O	R	H	G	D	V	B	K
A	U	R	O	A	N	L	O	S	T	U	K	W	E	L	O	K	P	M	V	C	H	R	D
M	W	T	R	S	S	T	A	N	D	A	R	D	I	Z	E	D	P	O	L	I	K	J	Y
I	K	H	I	O	I	T	N	S	N	E	O	L	I	Z	F	S	G	B	K	W	L	L	U
K	C	N	H	O	S	O	F	O	N	Z	L	L	O	E	S	W	Q	G	H	U	I	T	T
A	B	T	O	L	T	U	L	Q	T	P	S	V	O	L	M	E	P	I	Z	O	O	L	R
V	O	L	U	M	E	K	S	N	P	T	I	N	S	U	A	L	I	U	Y	E	R	S	G
K	C	L	A	N	N	D	E	L	T	M	N	O	L	K	F	B	N	R	O	W	E	R	P
A	O	B	M	S	T	O	O	N	S	K	I	S	O	G	H	C	T	Q	P	L	K	O	F

Determining Equivalent Volume Measures

1. 16
2. 8
3. 1 T
4. 1
5. 5
6. 1
7. 8
8. 4
9. 1/4
10. 2
11. 4
12. 1
13. 2
14. Qt
15. 2
16. 2
17. 1
18. 4
19. 16
20. 128
21. Pt
22. 8
23. 5 1/3
24. 14
25. 48
26. 1 -- T
27. 16
28. Qt -- 4
29. 1/2 -- 8
30. 1 -- 128

Sizing-Up A Can

1. No. 10
2. No. 2 1/2
3. No. 3
4. No. 1 Tall
5. No. 5
6. No. 2
7. No. 300
8. 2 No. 10, 3 No. 1 or
   1 No. 3 and 1 No. 1
9. No. 3
10. 16 No. 10

Using Scoops and Ladles

I.

1.	1 T	1/2 oz	Small cookies
2.	2 T	1 - 1 1/2 oz	Drop cookies
3.	3 T	1 3/4 - 2 oz	Muffins - cupcakes
4.	4 T	2 - 2 1/4 oz	Desserts
5.	5 T (1/3 C)	2 1/2 - 3 oz	Vegetables - salads
6.	6 T	3 - 4 oz	Meat patties - hot cereals
7.	8 T (1/2 C)	4 - 5 oz	Luncheon dishes
8.	10 T	6 oz	Luncheon salads

II.

9.	1/8 C	1 oz	Sauces - salad dressings
10.	1/4 C	2 oz	Gravies
11.	1/2 C	4 oz	Stews
12.	3/4 C	6 oz	Stews - creamed dishes
13.	1 C	8 oz	Soup

III.

1. 3/4 C -- t
2. -- 6
3. 5/8 -- 10
4. 1/16 -- 1
5. C -- 3 T
6. C -- T
7. C -- 8

IV.

1. 1/8 C
2. 1/4 C
3. 1/3 C
4. 1/2 C
5. 3/4 C
6. 1 C

V.

1. 16
2. 16
3. Drop cookies
4. Stews
5. Sauces/salad dressings
6. No. 16
7. 8 oz
8. #16

a bird's eye view

DETERMINING PLEATS AND SPACES
FOR
VALANCES, DRAPERIES, AND CURTAINS

Understand this math concept:

Adding inches, adding fractions, and finding fraction equivalents.

Teacher Materials

Information Sheet
Sample Lesson Plan

Student Materials

Assignment Sheet:	Addition and Conversion of Fractions
Information Sheet:	Figuring Pleating And Spacing
Skill Builders:	Words to Know Adding Fractions Pleating And Spacing

TEACHER INFORMATION SHEET

Understand this math concept:

Adding inches, adding fractions, and finding fraction equivalents.

Adding Inches

$$\begin{array}{rl} 23 & \text{inches} \\ 6 & \text{inches} \\ 7 & \text{inches} \\ 3\ 1/2 & \text{inches} \\ \hline 39\ 1/2 & \text{inches} \end{array} \qquad\qquad \begin{array}{rl} 21\ 1/2 & \text{inches} \\ 6\ 1/2 & \text{inches} \\ 7 & \text{inches} \\ 9\ 1/2 & \text{inches} \\ \hline 43\ 3/2 & = 44\ 1/2 \text{ inches} \end{array}$$

Adding Fractions

To add fractions they must have a common denominator. When adding with like fractions, add only the numerators.

$$\begin{array}{ll} 2 & \text{numerator (part)} \\ \overline{7} & \text{denominator (whole)} \end{array}$$

$$\frac{2}{7} + \frac{3}{7} + \frac{8}{7} + \frac{6}{7} = \frac{19}{7} \text{ or } 2\frac{5}{7}$$

Adding Unlike Fractions

In order to arrive at a common denominator, it is necessary to find a fraction equivalent. To do this, multiply the numerator and denominator of a fraction by the same number as shown in the following examples.

a. $\frac{2}{3} = \frac{2 \times 3}{3 \times 3} = \frac{6}{9}$

b. $\frac{3}{7} = \frac{3 \times 2}{7 \times 2} = \frac{6}{14}$

c. $\frac{1}{3} = \frac{1 \times 6}{3 \times 6} = \frac{6}{18}$

d. $\frac{3}{5} = \frac{3 \times 4}{5 \times 4} = \frac{12}{20}$

e $\frac{3}{5} = \frac{3 \times 4}{5 \times 4} = \frac{12}{20}$

f. $\frac{2}{3} = \frac{2 \times ?}{3 \times ?} = \frac{14}{21}$

g. $\frac{9}{10} = \frac{9 \times ?}{10 \times ?} = \frac{27}{30}$

h. $\frac{3}{5} = \frac{?}{15}$

i. $\frac{1}{6} = \frac{3}{?}$

Common Factors

In working with fractions, common factors are used. If two numbers have some factors that are the same, the numbers have common factors.

1 × 12 = 12   2 × 6 = 12   3 × 4 = 12

(1, 2, 3, 4, 6, 12 is the set of factors of 12)

1 × 18 = 18   2 × 9 = 18   3 × 6 = 18

(1, 2, 3, 6, 9, 18 is the set of factors of 18)

	FACTORS	COMMON FACTORS
8 20	1, 2, 4, 8 1, 2, 4, 5, 10, 20	1, 2, 4
16 24	1, 2, 4, 8, 16 1, 2, 3, 4, 8, 12, 24	1, 2, 4, 8
12 30	1, 2, 3, 4, 6, 12 1, 2, 3, 5, 6, 10, 15, 30	1, 2, 3, 6

What would the common factors be?

a. 5, 20
b. 30, 42
c. 12, 48
d. 12, 15
e. 16, 36
f. 12, 16
g. 10, 18
h. 15, 30
i. 6, 48
j. 12, 32
k. 6, 18
l. 24, 40

To add unlike fractions, use a common factor to find a common denominator.

$$\begin{array}{rr} 2/3 & 2/3 \times 4 = 8/12 \\ +\ 1/12 & = 1/12 \\ \underline{3/4} & 3/4 \times 3 = \underline{9/12} \\ & \frac{18}{12} = 1\ \frac{6}{12} = 1\ \frac{1}{2} \end{array}$$

$$\begin{array}{rr} 3/5 & 3/5 \times 4 = 12/20 \\ +\ 1/20 & = 1/20 \\ 7/10 & 7/10 \times 2 = 14/20 \\ \underline{3/4} & 3/4 \times 5 = \underline{15/20} \\ & \frac{42}{20} = 2\ \frac{2}{20} = 2\ \frac{1}{10} \end{array}$$

SAMPLE LESSON PLAN

Math Concept: Addition and Conversion of Fractions
Task: Determining Pleats and Spaces for Valances, Draperies, and Curtains

Objective: The student will be able to:

1. Add inches, fractions and find fraction equivalents.
2. Determine the amount of inches needed for pleats and spaces in draperies and pleated curtains.

Teaching Aids:

Chalk
Chalkboard

I. Preparation of the Learner:

Custom-made draperies begin with accurate measurements. These measurements are necessary to give an accurate fit. To figure these measurements, you will need to add and divide whole and fractional numbers.

II. Presentation:

CONCEPT	CLASSROOM ACTIVITY
Adding inches	Chalkboard talk: Use Teacher Information Sheet
Adding fractions Fraction equivalents and common factors	Copy problems on chalkboard and have the students work them or have students complete the Skill Builder - Adding Fractions.
Figuring pleating and spacing for draperies	Demonstration: Use Student Information Sheet

III. Application:

Have students complete Skill Builders on the assignment sheet individually or in groups.

IV. Evaluation

TEST - ADDING FRACTIONS

Directions:

Add the following fractions. Show work.

1. 6/8
3/24
1/3

2. 1/18
2/9
3/6

3. 1/5
6/25

4. 1/9
2/3

5. 8/12
3/4
2/3

6. 2/7
1/3
4/21

7. 1/5
14/30
5/6

8. 4/5
2/10
1/4

9. 11/12
1/3
2/4

10. 2/15
1/30
4/5

ASSIGNMENT SHEET

Math Concept: Addition and Conversion of Fractions

Task: Determining Pleats and Spaces for Valances, Draperies, and Curtains

Why learn this?

Draperies and pleated curtains have equal spacing of pleats with an equal amount of fullness in each pleat. Determining the amount of inches needed for each pleat and equal spacing is necessary if one is to create a custom look.

Principle Emphasized:

Adding inches, adding fractions, and finding fraction equivalents.

Words to Know:

Draperies
Fabric Width
Overlap
P.E.S.
Panel
Pleat
Pleated Curtains
Pleat each side
Return
Space

Resources: Information Sheet - Figuring Pleating and Spacing

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1. Read the resource
2. Complete Skill Builder - Words to Know
3. Complete Skill Builder - Adding Fractions
4. Complete Skill Builder - Pleating and Spacing

INFORMATION SHEET

FIGURING PLEATING AND SPACING

A pleat is a decorative fabric fold used to control fullness at regular intervals. Since windows and draperies vary in size, there is no set rule for spacing pleats. When determining pleats and spaces, the spaces are always the exact width calculated, but the pleats may vary slightly in size. NOTE: The drapery measurement may need to be adjusted 1/4 inch to 1/2 inch. Make the adjustment in the pleats, not the spaces. Below is a formula that can be used for your specific drapery size.

Formula for Determining Pleats

1. P.E.S. - Subtract the P.E.S.** from total width of drapery panel before pleated down.

   P.E.S.** stands for "pleat each side." Pleat each side is the finished measurement of one drapery panel pleated down. For example, if the width of a window in 70 inches, the P.E.S. is 35 inches. Each panel will be pleated down to 35 inches to fit the finished window width of 70 inches.

   PROBLEM 1 - The finished window width is 42 inches.
   What is the P.E.S.? = 21 inches

2. Number of Pleats - Divide the answer by the number of pleats needed.

   Following are two charts entitled "48 Inch Fabric Cut Width" and "54 Inch Fabric Cut Width." Each chart gives the number of pleats required for specific widths of drapery. For example, if 48 inch wide fabric is used and two widths are sewn together to make one panel, you will find on the chart that 10 pleats are needed in each panel.

48 INCH FABRIC CUT WIDTH

WIDTHS	NUMBER OF PLEATS	SPACING PROCESS
1	5	One pleat on each end--center and center again.
1 1/2	7	One pleat on each end, center, then fold in remaining four pleats.
2	10	Two pleats at one end, one at the other--center, center and center again.
2 1/2	12	Three pleats at one end, two at the other--center, center and center again.
3	17	One pleat on each end--center, center and center again until the process ends.
3 1/2	17	Same as 3 widths.
4	20	Three pleats at one end, two at the other--center, center, center and keep centering.
4 1/2	22	Four pleats at one end, three at the other--center, center, center and keep centering.
5	25	One pleat at each end--center for third pleat, center, center, then fold in fourths for last pleats.

54 INCH FABRIC CUT WIDTH

WIDTHS	NUMBER OF PLEATS	SPACING PROCESS
1	6	Two pleats at one end, one at the end--center, center and center again.
1 1/2	8	Two pleats at one end, one at the other end--center, then fold in fourths for last pleats.
2	12	Three pleats at one end, two at the other--center, center and center again.
2 1/2	14	Two pleats at one end, one at the other--center, center, then fold in fourths.
3	18	Two pleats at one end, two at the other--center, center, center and keep centering.
3 1/2	20	Three pleats at one end, two at the other--center, center and keep centering.
4	24	One pleat at one end--center, center, center, then fold in fourths.
4 1/2	27	Two pleats at each end--center, center, center, then fold in fourths.

PROBLEM 2 - The drapery fabric being used is 54 inches wide. One panel has 1 1/2 widths. How many pleats are needed in the panel? 8

3. To Determine Spaces -

   a. Add the returns to the P.E.S. The returns are usually 7 inches (3 inches for overlap and 4 inches for return). The return is determined by the amount of space between the wall and the rod.

      Return
      X X X X
      Overlays

   b. Divide the answer to 3 - a. by the number of spaces. This figure is always one less than the number of pleats. The answer is the size of each space.

      9 Spaces
      X X X X X X X X X X

4. To Determine the Size of Each Space -

   a. Subtract the overlap and returns from the size of each space.

      42 inches P.E.S.
      - 7 inches overlap and returns
      35 inches (ANSWER)

   b. Divide 35 by the number of spaces needed.

      9 = number of spaces needed
      35 = P.E.S.-Returns

      3 8/9 inches (ANSWER)
      9) 35
      27
      8 or (8/9)

5. To Determine Size of Pleats -

a. Subtract the P.E.S., returns, and two side hems (2 inches each) from the width of the drapery panel before pleated down.

Step 1.

$$\begin{array}{rl} 35 & \text{inches P.E.S.} \\ 7 & \text{inches returns} \\ 2 & \text{inches side hem} \\ \underline{2} & \underline{\text{inches side hem}} \\ 46 & \text{inches (ANSWER)} \end{array}$$

Step 2.

$$\begin{array}{rl} 96 & \text{inches (Total fabric width)} \\ - \underline{46} & \underline{\text{inches}}\ \text{P.E.S., returns and two side hems} \\ 50 & \text{inches (ANSWER)} \end{array}$$

b. Divide the answer by the number of pleats needed. This tells how large each pleat will be.

50 inches ÷ 10 pleats = inches in each pleat

$$\begin{array}{r|l} & \ \ 5 \text{ (ANSWER)} \\ \hline 10\ ) & \ \ 50 \\ & \ \ \underline{50} \end{array}$$

SKILL BUILDER

WORDS TO KNOW

Directions:

After defining the vocabulary words listed on the Assignment Sheet, try to unravel the words in Items 1-9 below.

To find the answer to Question 10, unravel the letters boxed in in Items 1-9.

1. A L [T] P E ☐☐☐☐☐
2. C S [A] E P ☐☐☐☐☐
3. E T [N] U R R ☐☐☐☐☐☐
4. L P T [E] A C A E H [I] E S [D]

   ☐☐☐☐☐ ☐☐☐☐ ☐☐☐☐
5. P [R] [I] S E D A E R

   ☐☐☐☐☐☐☐☐☐
6. V R E L O P A ☐☐☐☐☐☐☐
7. N [A] L P E ☐☐☐☐☐
8. E T P D L A E T C [R] A N I S U

   ☐☐☐☐☐☐☐ ☐☐☐☐☐☐☐☐
9. R A I F C [B] T D H I W

   ☐☐☐☐☐☐ ☐☐☐☐☐

10. What do you have left when you are through calculating pleats and spaces?

    ☐ ☐☐☐☐☐ ☐☐☐☐☐

SKILL BUILDER

ADDING FRACTIONS

Directions:

Add the following fractions, showing your work, as seen in the example.

EXAMPLE:

$$\begin{array}{rccccc} & 1/2 & = & \underline{1 \times 3} & = & 3/6 \\ + & 1/3 & & 2 \times 3 & = & \underline{2/6} \\ & & & & & 5/6 \end{array}$$

1. $\begin{array}{r} 2/3 \\ + \underline{1/9} \end{array}$

2. $\begin{array}{r} 1/5 \\ + \underline{5/6} \end{array}$

3. $\begin{array}{r} 2/7 \\ + \underline{1/2} \end{array}$

4. $\begin{array}{r} 1/4 \\ + \underline{2/5} \end{array}$

5. $\begin{array}{r} 3/4 \\ + \underline{1/2} \end{array}$

6. $\begin{array}{r} 2/9 \\ + \underline{1/3} \end{array}$

7. $\begin{array}{r} 7/12 \\ +\underline{11/24} \end{array}$

8. $\begin{array}{r} 5/6 \\ 1/3 \\ \underline{1/4} \end{array}$

9. $\begin{array}{r} 4/9 \\ 1/2 \\ \underline{5/6} \end{array}$

10. $\begin{array}{r} 3/4 \\ 3/8 \\ \underline{2/3} \end{array}$

11. $\begin{array}{r} 7/12 \\ 1/8 \\ \underline{1/4} \end{array}$

12. $\begin{array}{r} 2/3 \\ 1/12 \\ \underline{3/4} \end{array}$

SKILL BUILDER

PLEATING AND SPACING

Directions:

Complete the following problems.

FORMULA FOR DETERMINING PLEATS

1. Pleat one panel of 1 1/2 inch widths, 48 inch fabric. The P.E.S. is 25 inches. The overall drapery width of the panel before pleated down is 60 inches.

   a. How many pleats will the panel have? _____
   b. How large will each pleat be? _____

2. Pleat one panel of two widths, 54 inch fabric. The P.E.S. is 45 inches. The overall drapery width of the panel before pleated down is 100 inches.

   a. How many pleats will the panel have? _____
   b. How large will each pleat be? _____

3. Pleat one panel of 3 widths, 48 inch fabric, to 60 inches. The P.E.S. is 60 inches. The overall drapery width of the panel before pleated down is 136 inches.

   a. How many pleats will the panel have? _____
   b. How large will each pleat be? _____

DETERMINING SPACES

4. Pleat one panel of 1 1/2 widths, 48 inch fabric, to 25 inches. The P.E.S. is 25 inches. There are 7 pleats in the panel and 7 inches for overlap and return.

   a. How many spaces are there in the panel? _____
   b. How large is each space? _____

5. Pleat one panel of 2 widths, 54 inch fabric, to 45 inches. The P.E.S. is 45 inches. There are 12 pleats and 7 inches for overlap and return.

   a. How many spaces are there in the panel? _____
   b. How large is each space? _____

SKILL BUILDERS

ANSWER SHEET

Words to Know

1. Pleat
2. Space
3. Return
4. Pleat Each Side
5. Draperies
6. Overlap
7. Panel
8. Pleated Curtains
9. Fabric Width

10. A Tired Brain

Adding Fractions

1. 6/9 + 1/9
2. 6/30 + 25/30
3. 4/14 + 7/14
4. 5/20 + 8/20
5. 3/4 + 2/4
6. 2/9 + 3/9
7. 14/24 + 11/24
8. 10/12 + 4/12 + 3/12
9. 8/18 + 9/18 + 15/18
10. 18/24 + 9/24 + 16/24
11. 14/24 + 3/24 + 6/24
12. 8/12 + 1/12 + 9/12

Pleating and Spacing

1. a. 7
   b. 5

2. a. 12
   b. 4 7/12

3. a. 6
   b. 3

4. a. 11
   b. 5 5/11

5. a. 16
   b. 3 5/16

a bird's eye view

DRAFTING PATTERNS
FOR SWAGS AND JABOTS (CASCADES)

Understand this math concept:

Multiplication of fractions

Teacher Materials
Information Sheet
Sample Lesson Plan

Student Materials

Assignment Sheet: Multiplication with Fractions
Information Sheet: Swags and Jabots
Determining Cost of Yardgoods
Skill Builders: Swagword Puzzle
Drafting Swags and Jabots

TEACHER INFORMATION SHEET

Understand this math concept:

Multiplication of fractions

Multiplication with Fractions

If your instructions tell you to double the length of a piece of fabric, you would multiply it by two.

36 inches × 2 = 72 inches

If your instructions tell you to add 1/2 the width of the window for fullness, to compute the total width of your fabric you would multiply it by 1 1/2 (width of window -- 1 + 1/2 for fullness).

$$36 \text{ inches} \times 1\ 1/2 = 36 \text{ inches} \times \frac{3}{2} = \frac{36}{1} \times \frac{3}{2} = \frac{108}{2} = 54 \text{ inches}$$

If your instructions tell you to increase the fullness 1 1/3 times the width of the window, you would multiply the width by 2 1/3 (width of window -- 1 + 1 1/3 width for fullness).

$$36 \text{ inches} \times 2\ 1/3 = 36 \text{ inches} \times \frac{7}{3} = \frac{36}{1} \times \frac{7}{3} = \frac{252}{3} = 84 \text{ inches}$$

To Find a Fraction of a Whole Number, Multiply the Whole Number by the Fraction.

$$1/4 \text{ of } 8 = \frac{1}{4} \times \frac{8}{1} = \frac{8}{4} = 2$$

$$1/6 \text{ of } 36 = \frac{1}{6} \times \frac{36}{1} = \frac{36}{6} = 6$$

$$1/12 \text{ of } 200 = \frac{1}{12} \times \frac{200}{1} = \frac{200}{12} = 16\frac{8}{12} \text{ OR } 16\frac{2}{3}$$

1 1/12 of 200 = $\frac{13}{12} \times \frac{200}{1} = \frac{2600}{12} = 216\ \frac{8}{12}$ OR $216\ \frac{2}{3}$

2 1/8 of 56 inches = ______. ($\frac{17}{8} \times \frac{56}{1} = \frac{952}{8} = 119$)

3 1/3 of 92 inches = ______. ($\frac{10}{3} \times \frac{92}{1} = \frac{920}{3} = 306\ \frac{2}{3}$)

6 1/4 of 87 inches = ______. ($\frac{25}{4} \times \frac{87}{1} = \frac{2175}{4} = 543\ \frac{3}{4}$)

2 1/5 of 341 inches = ______. ($\frac{11}{5} \times \frac{341}{1} = \frac{3751}{5} = 750\ \frac{1}{5}$)

SAMPLE LESSON PLAN

Math Concept: Multiplication with Fractions
Task: Draft Patterns for Swags and Jabots

Objective: The student will be able to:

1. Multiply a whole number with a fractional number.
2. Draft patterns for swags and jabots (cascades).

Teaching Aids:

Pictures of swags and jabots
Yardstick
Paper for drafting pattern
Colored pencil or magic marker
Large table surface
Straight pins

I. Preparation of the Learner:

When drafting patterns for swags and jabots, you will need to know how to figure the allowance for fullness. For example, the directions might instruct you to add 1/3 of the finished swag depth for fullness. How would you mathematically figure the amount to add?

II. Presentation:

CONCEPT	CLASSROOM ACTIVITY
Multiplication with fractions	Show pictures of swags and jabots and point out how added fabric gives fullness. Chalkboard Talk: Use Teacher Information Sheet to show students how to compute the amount of additional fabric needed for fullness.
Draft Swags	Use Student Information Sheet to demonstrate the correct method for drafting patterns for swags.
Draft Jabots	Demonstration: Use Student Information Sheet to demonstrate the correct method for drafting patterns for jabots.

III. Application:

Have students complete Skill Builders on Student Assignment Sheet individually.

IV. Evaluation:

Find the number of inches needed.

Width of Window		Fullness		(Answer Key) Total Inches Needed
1. 48 inches	Add	1/3	fullness	64 inches
2. 26 inches	Add	1/4	fullness	32.5 = 33 inches
3. 90 inches	Add	1/2	fullness	135 inches
4. 54 inches	Add	1 1/2	fullness	135 inches
5. 72 inches	Add	2 1/8	fullness	225 inches
6. 64 inches	Add	3 1/3	fullness	277 inches
7. 120 inches	Add	1 5/6	fullness	340 inches
8. 15 inches	Add	1 7/8	fullness	43.1 = 44 inches
9. 118 inches	Add	2 3/4	fullness	442.5 = 443 inches
10. 93 inches	Add	2 6/7	fullness	359 inches

Quest Activity:

1. Using interior design references, have the students find pictures of swags and jabots. After the pictures are found, have the students sketch styles of swags and jabots, or cut pictures from magazines. Compose a notebook illustrating swags and jabots.
2. Have the students do a cost study of custom-made swags and jabots. Make a comparison of the charges of local workrooms vs. cost of constructing the swags and jabots themselves.

ASSIGNMENT SHEET

Math Concept: Multiplication with Fractions

Task: Draft Patterns for Swags and Jabots (Cascades)

Why learn this?

Swags and jabots are attractive window treatments if they fit the window correctly. In order to achieve a perfect fit, correct measurements must be taken and a pattern drafted.

Principle Emphasized: Multiplication of fractions

Words to Know:

Bottom Measurement
Cafe Rod
Cascades
Cornice
Double Swag
Finished Swag Depth
Jabots
Return
Swag
Top Measurement

Resources: Information Sheet: Swags and Jabots

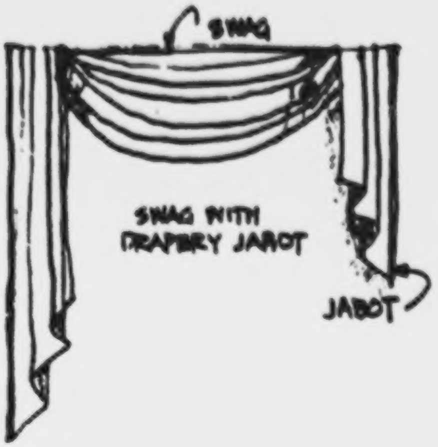
---

1. Read the Information Sheet
2. Complete Number Talk
3. Complete Skill Builder - Drafting Swags and Jabots

INFORMATION SHEET

SWAGS AND JABOTS

Swags--a decorative top treatment that is usually attached to a cornice or hung from cafe curtain rods. Very elegant and formal, swags can be used alone or to top off a regular drapery window treatment.

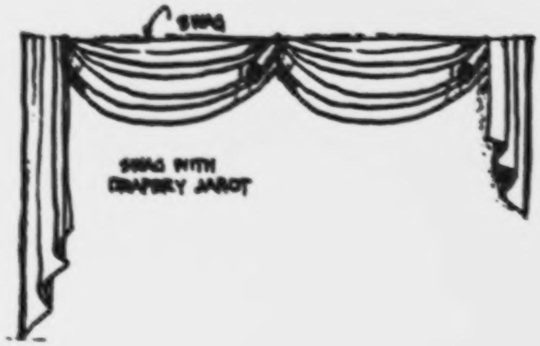


SWAG--Draped fabric over a curtain rod which gives a formal, ornate appearance. The swag folds should fall in front, with the ends hidden or well finished. Fabric used for swagging should be heavy and pliant so that it drapes well and remains in place.

JABOTS--The hangings on either side of a swag. They can go in back or front of the swag. Jabots can be short or floor length. Another name for jabot is cascade.

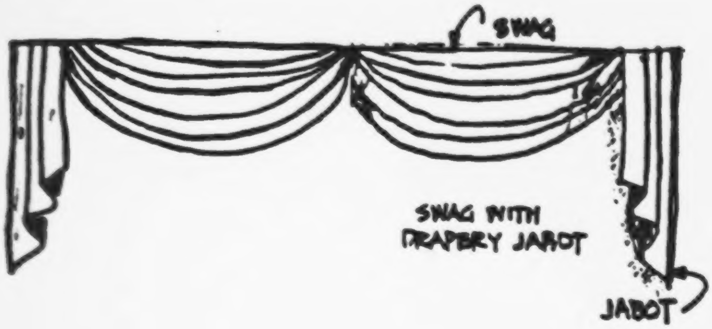
There are two common methods of creating swags. They can be hung from a cafe curtain rod or they can be mounted on the shelf-type valance board. The swag can be rounded, triangular, or any decorative shape that complements the decor.

When using a cafe rod for a simple swag, drape the curtain over the rod, with jabots in back and swag in front. To create a double swag for a large window, drape the swag as shown in the following picture.



SWAG

A double swag is made in four pieces. Two swags and two jabots are sewn or fastened to each other with velcro or snap tape. Swags may vary in depth from 12 inches to 36 inches.



To draft a swag, measure the width of the area to be covered. This will be the top measurement. The bottom measurement equals the finished swag depth plus allowance for fullness. The finished swag depth is the length of the swag when completed. Add 1/3 of the finished swag depth for fullness. For example, if the finished swag depth is 12 inches, the bottom measurement must be at least 16 inches --

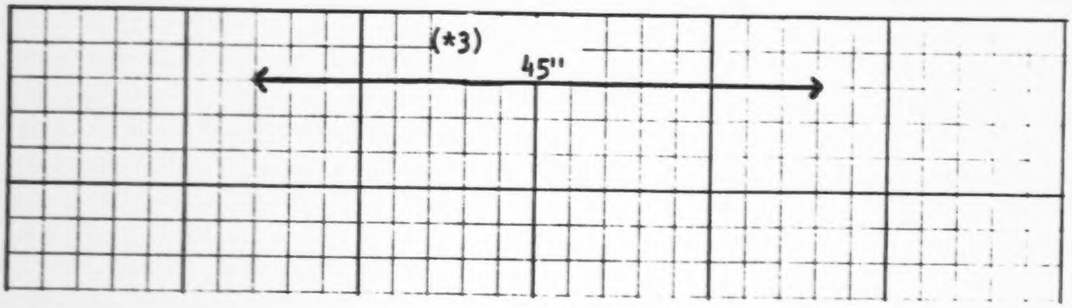
$$1/3 \text{ of } 12 = \frac{1}{3} \times \frac{12}{1} = \frac{12}{3} = 4 \quad (12 \text{ inches} + 4 \text{ inches} = 16 \text{ inches})$$

Before constructing a swag, make a diagonal line pattern. Using a diagonal line pattern is a sure way to make a perfect swag. Paper or muslin can be used for preparing the pattern.

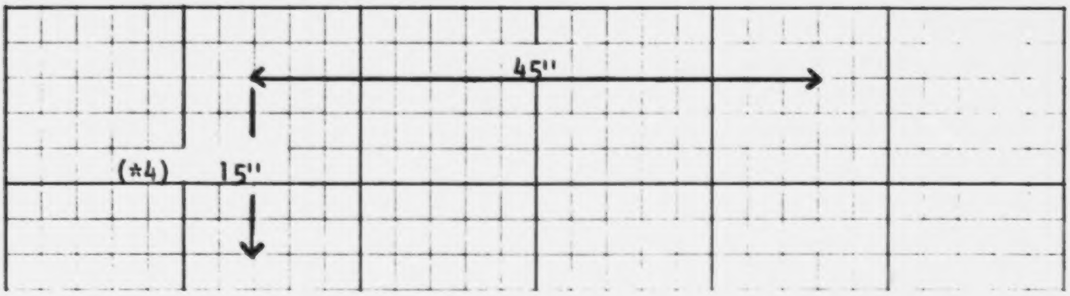
1. Lay the paper or muslin right side up.

2. Start with paper one-half to one yard wider than the top measurement of the swag.

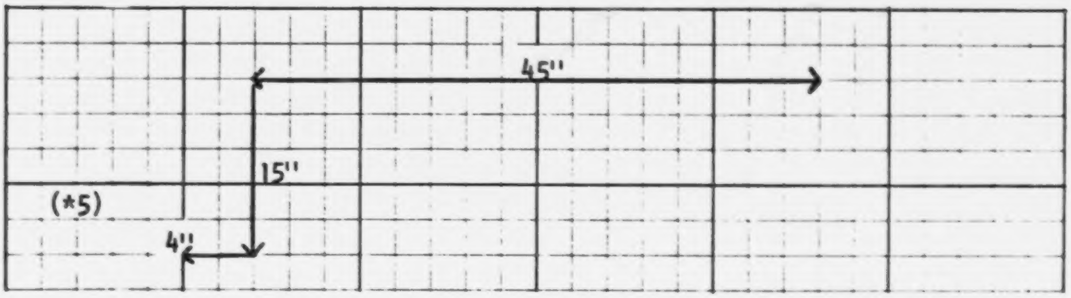
*3. In the center of the paper, mark the width of the swag top.



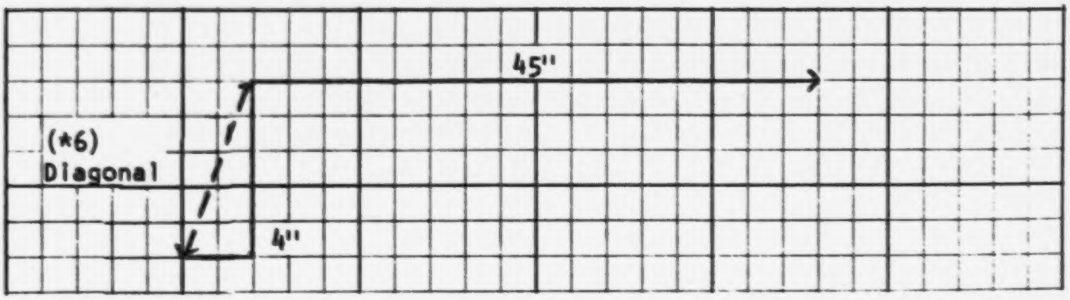
*4. From each outside mark, drop a line straight down the pattern to the bottom edge. Measure 15 inches down this line and mark.



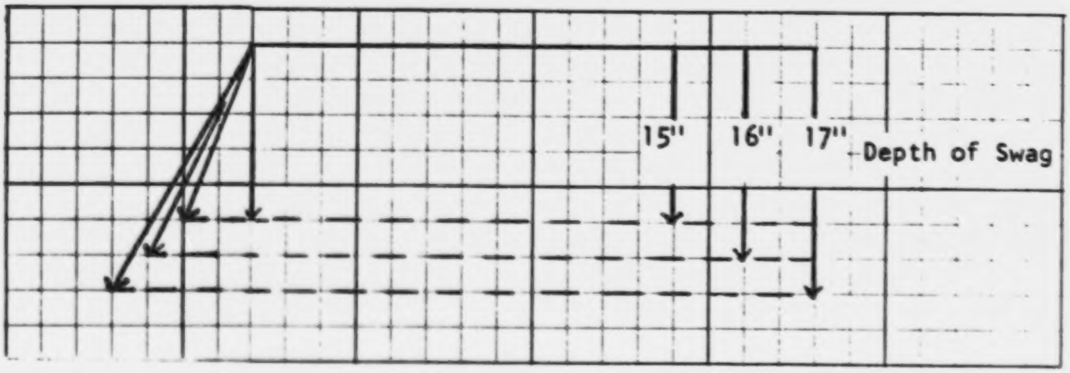
*5. From this mark measure 4 inches toward the outside edge of the pattern.



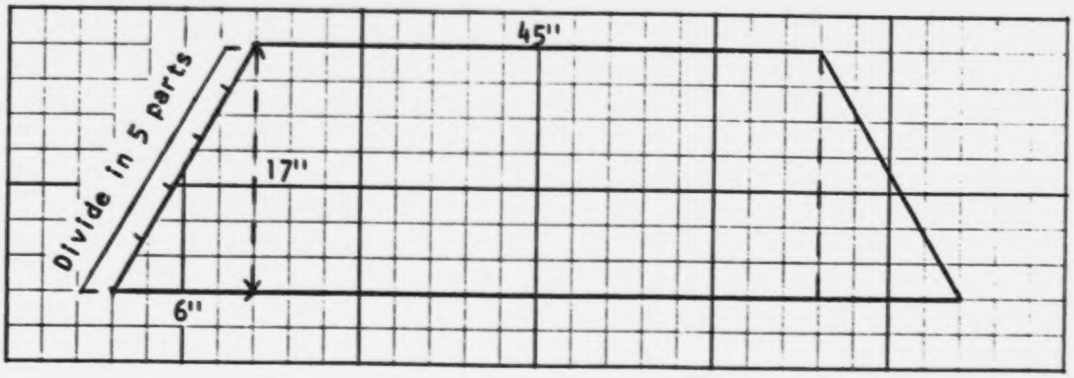
*6. Then draw a diagonal line from the mark to the top edge marking of the swag.



7. For a swag 16 inches deep, mark 5 inches out from the base line; for a 17 inch swag, the mark should be 6 inches out. Increase an inch in width on both sides of the swag for each added inch of depth desired.



8. Next decide how many folds the swag will have. For four folds, divide the diagonal line into five parts.



9. Cut out the paper pattern using notched markings for the folds, and pin it to the swag fabric, with the fabric right side up.

JABOT

To draft a jabot: 1) measure the width of the area to be covered; 2) add 9 inches for pleat allowance; 3) add needed allowance for return. This is the overall width. Example: If the width of the area to be covered is 12 inches and the return is 4 inches, the overall width would be 25 inches.

12 inches + 9 inches + 4 inches = 25 inches

Try a problem: 15 inches is the width to be covered
9 inches is the pleat allowance
7 inches is the return

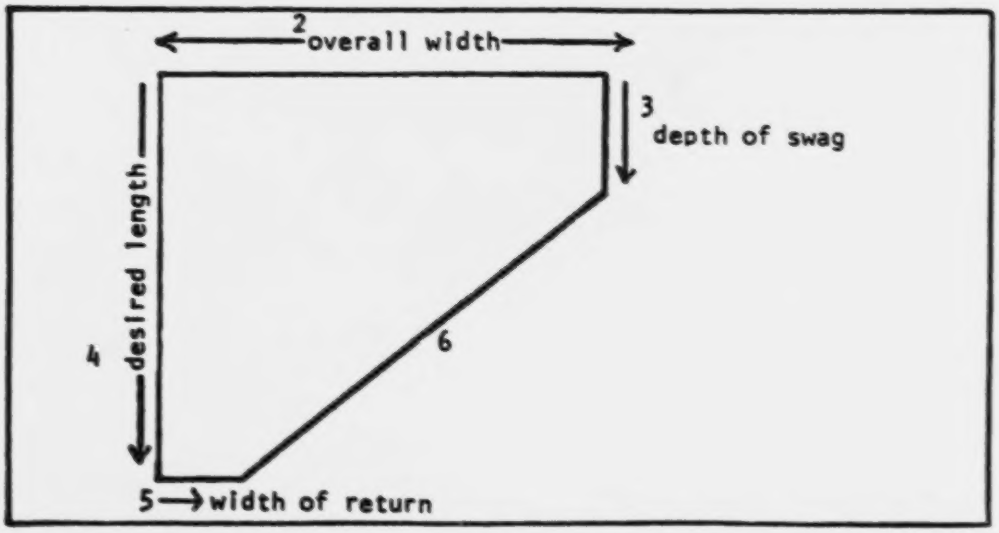
What is the overall width? 31 inches

15 inches + 9 inches + 7 inches = 31 inches

Jabots vary in length from 27 inches to floor length. Jabots are usually made 25 inches wide and 27 inches long. The inside edge is usually the depth of the swag, and the bottom horizontal edge is the width of return.

Width of Return

1. Lay the paper or muslin right side up.
2. At the top center of the paper mark the overall width (#2 below).
3. From one outside mark, mark the depth of the swag (#3 below).
4. From the other outside mark, mark the desired length (#4 below).
5. At the desired length mark, measure the amount for the return (#5 below).
6. Draw diagonal line from the depth of swag to the width of return.



7. Cut out the pattern adding seam allowances. NOTE: The standard home furnishing seam allowance is 1/2 inch.

INFORMATION SHEET

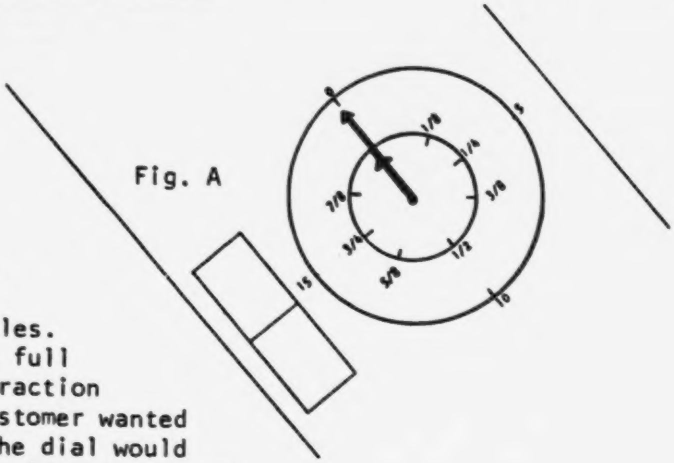
DETERMINING COST OF YARDGOODS

As a fabric clerk you will be called upon to measure yardage and determine the cost per yard. Many fabric stores use a yardage counter machine as a quick and accurate way to figure the price of yardage. The machine dial looks similar to the picture in Figure A.

Calculating Cost With a Yardage Counter Machine

The steps in operating the machine are to 1) set the machine to zero, and 2) pull the edge of the cloth through the machine until the dial indicates the amount of cloth ordered by the customer.

Fig. A



The dial is divided into two circles. The outer circle is the number of full yards and the inner circle is a fraction of a yard. For example: If a customer wanted 11 1/4 yards, the long arrow on the dial would point to 11 and the short arrow would point to 1/4. See Figure B.

To calculate the cost of the yardage, look at the indicator. The indicator automatically figures the total cost. In Figure B, the upper dial (1) shows the total cost of the yardage. The bottom dial (2) shows the cost per yard.

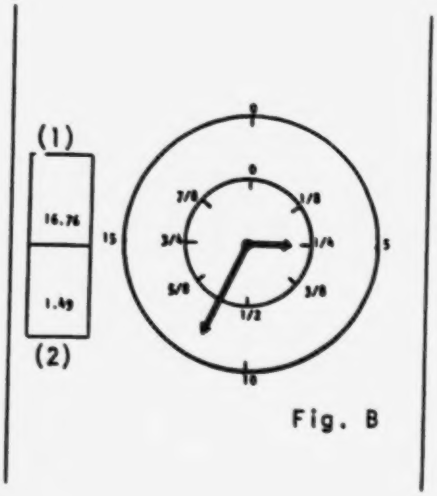


Fig. B

SKILL BUILDER

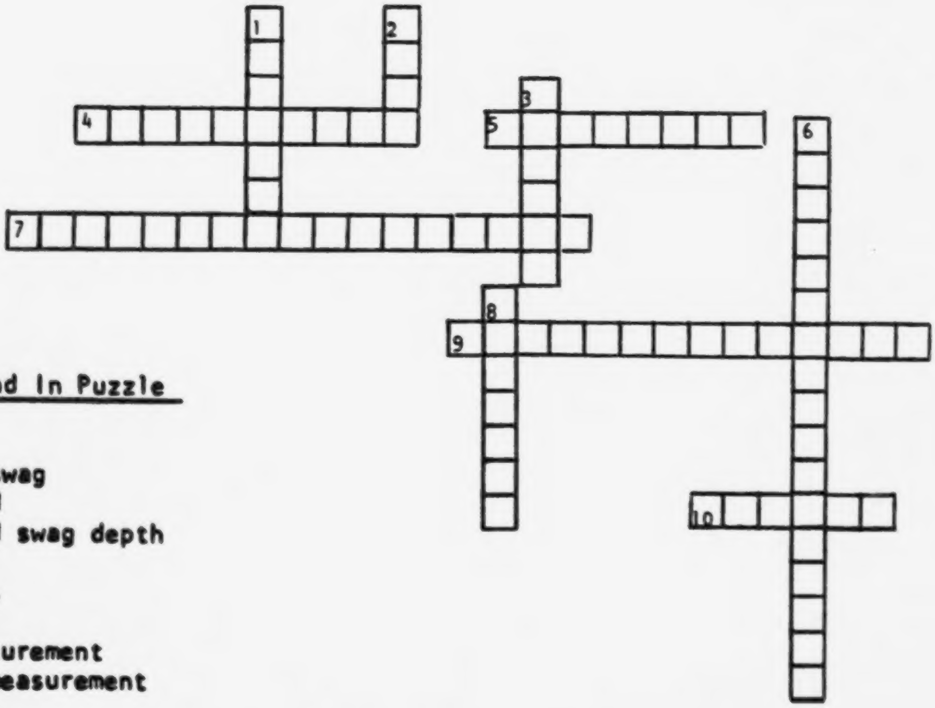
SWAGWORD PUZZLE

Across

4. Consists of two swags and two jabots.
5. Another name for jabots.
7. Length of swag when completed.
9. The width of the swag.
10. The distance from the wall to where the rod begins.

Down

1. This term covers a range of styles from simple, round brass rods to larger, more decorative fluted rods with ornate finials.
2. Draped fabric over a curtain rod which gives a formal ornate appearance.
3. The hangings on either side of a swag.
6. The finished swag depth plus allowance for fullness.
8. Decorative or straight wooden frame mounted over a window treatment.



Words Found In Puzzle

swag
double swag
cafe rod
finished swag depth
jabots
cascades
cornice
top measurement
bottom measurement
return

SKILL BUILDER

ANSWER SHEET

Crossword Puzzle Answers

Across

4. double swag
5. cascades
7. finished swag depth
9. top measurement
10. return

Down

1. cafe rod
2. swag
3. jabots
6. bottom measurement
8. cornice

SKILL BUILDER

DRAFTING SWAGS AND JABOTS

1. Draft a swag pattern using the following measurements:

   36 inch top measurement
   18 inch swag depth

2. Draft a jabot pattern using the following measurements:

   25 inch overall width
   27 inch desired length of jabot
   7 inch width of return
   15 inch depth of swag

a bird's eye view

INCREASING AND DECREASING STANDARDIZED RECIPES

Understand this math concept:

Multiplication and division of weights and measures

Teacher Materials

Information Sheet
Sample Lesson Plan

Student Materials

Assignment Sheet:	Increase and/or Decrease Standardized Recipes
Information Sheet:	Increasing and Decreasing Recipes
Skill Builders:	Words to Know Converting Standardized Recipes

TEACHER INFORMATION SHEET

Understand this math concept:

Multiplication and division of weights and measures

Knowing how many the recipe will serve or the yield of the recipe, is quite important in food service. Because of the high cost of food, making too much can result in leftovers or waste, while making too little may leave someone hungry. Most standardized recipes for quantity foods yield 25, 50, or more servings. When serving a larger or smaller group than the recipe calls for, the recipe must be converted to the yield required.

To convert a recipe, increase or decrease each ingredient by the same amount needed to increase or decrease the yield. Recipe conversion requires some basic math skills including:

- Multiplication of whole numbers
- Division of whole numbers
- Multiplication and division of decimal fractions
- Weight equivalents
- Volume equivalents

Weight Measurements

16 ounces = 1 pound

1 cup = 8 fluid ounces

Volume Measurements

3 teaspoons = 1 tablespoon
16 tablespoons = 1 cup
2 cups = 1 pint
4 cups = 2 pints or 1 quart
4 quarts = 1 gallon

Multiplication of Whole Numbers

Multiplication is like successive addition.

5 + 5 + 5 + 5 + 5 + 5 = 30

(Six 5's equal 30)

OR

5 x 6 = 30

The numbers being multiplied are called factors and the results are called the products.

$$\underset{\text{(Factor)}}{5} \quad \times \quad \underset{\text{(Factor)}}{6} \quad = \quad \underset{\text{(Product)}}{30}$$

Increasing a Recipe

To increase a recipe you will multiply the unit measure by the number of times you want to increase the yield. If the recipe is for 50 servings and you must serve 200 servings, you would multiply each ingredient by 4.

50 x 4 = 200 servings

10 c. Milk	10 c. x 4 = 40 c.
6 T. Sugar	6 T. x 4 = 24 T.
2 t. Salt	2 t. x 4 = 8 t.
10 oz. Raisins	10 oz. x 4 = 40 oz.
6 lbs. 7 oz. Apples	6 lbs. 7 oz. x 4 = 24 lbs. 28 oz. Or 26 lbs. 4 oz.

Once you have determined the increased quantity for each ingredient, the second step is converting the quantity to the largest unit of measure.

40 c. Milk = 2 gal. + 2 quarts
24 T. Sugar = 1 1/2 c.
8 t. Salt = 2 T. + 2 t.
40 oz. Raisins = 2 1/2 lbs.
24 lbs. 28 oz. = 25 lbs. 12 oz.

Division of Whole Numbers

Division is like repeated subtraction. Division is the opposite of multiplication.

40 - 10 - 10 - 10 - 10 = 0

What is Missing?

$$\begin{array}{r}10\\ \times\ ?\\ \hline 40\end{array} \qquad \begin{array}{r}8\\ \times\ ?\\ \hline 56\end{array} \qquad \begin{array}{r}5\\ \times\ ?\\ \hline 15\end{array} \qquad \begin{array}{r}4\\ \times\ ?\\ \hline 36\end{array} \qquad \begin{array}{r}3\\ \times\ ?\\ \hline 24\end{array}$$

Complete

8 x 3 = 24
so 24 ÷ 3 = ____

7 x 5 = 35
so 35 ÷ 5 = ____

9 x 8 = 72
so 72 ÷ 9 = ____

Notice!

$$\begin{array}{r} 9 \\ \times\ 3 \\ \hline 27 \end{array} \qquad \begin{array}{r} 3 \\ \times\ 9 \\ \hline 27 \end{array} \qquad \begin{array}{r} 9 \\ 3\overline{)\,27} \end{array} \qquad \begin{array}{r} 3 \\ 9\overline{)\,27} \end{array}$$

Notice!

$$\begin{array}{r} 5 \text{ (Unknown Factor)} \\ 9\overline{)\,45}\phantom{\text{ (Unknown Factor)}} \end{array}$$

(Factor) (Product)

Decreasing a Recipe

To decrease a recipe you will divide the unit of measure by the number of times you want to decrease the yield. If the recipe is for 50 servings and you want to serve 25 servings, you would divide 50 servings by 25 servings to find the factor by which you want to decrease the yield.

$$\begin{array}{r} 2 \\ 25\overline{)\,50} \end{array}$$

10 c. Milk	10 c. ÷ 2 = 5 c.
6 T. Sugar	6 T ÷ 2 = 3 T.
2 t. Salt	2 t. ÷ 2 = 1 t.
10 oz. Raisins	10 oz. ÷ 2 = 5 oz.
6 lbs. 7 oz. Apples	6 lbs. 7 oz. ÷ 2 = 3 lbs. 3 1/2 oz.

Increasing or Decreasing Using Decimal Fractions

$$\frac{3}{10} = \begin{array}{r} .30 \\ 10\overline{)3.00} \end{array}$$

$$\frac{9}{10} = \begin{array}{r} .90 \\ 10\overline{)9.00} \end{array}$$

$$\frac{11}{10} = \begin{array}{r} 1.10 \\ 10\overline{)11.00} \\ 10, \\ \hline 10 \end{array}$$

$$\frac{35}{50} = \begin{array}{r} .70 \\ 50\overline{)35.00} \end{array}$$

This shows how to change a fraction to a decimal equivalent.

To find the factor of increase or decrease for a standardized recipe:

STEP 1: Divide the number of servings you wish by the actual yield of the recipe.

Increase Recipe: Yield 50 servings
Need 70 servings

$$\begin{array}{r} 1.40 \\ 50\overline{)70.00} \\ 50 \\ \hline 200 \end{array} \text{ (Factor of Increase)}$$

Decrease Recipe: Yield 50 servings Need 20 servings

$$50\,\overset{.40}{\overline{)\,20.00}} \quad \text{(Factor of Decrease)}$$

STEP 2: Convert all recipe measurements to equivalents of ounces or tablespoons.

2 lbs. Flour = 32 oz. Flour

3 c. Milk = 48 T. Milk

STEP 3: To convert the measurements of each ingredient in the original recipe, multiply by the factor of increase or decrease.

a) To serve 20 from a recipe of 50 servings

2 lbs. Flour x 16 oz. = 32 oz. x .40 =

$$\begin{array}{r l} & 32 \text{ oz.} \\ \times & \underline{.40} \\ & 12.80 \text{ or } 12.8 \text{ oz.} \end{array}$$

b) To serve 70 from a recipe of 50 servings

2 lbs. Flour x 16 oz. = 32 oz. x 1.40 =

$$\begin{array}{r l} & 32 \text{ oz.} \\ \times & \underline{1.40} \\ & 1280 \\ & \underline{32} \\ & 44.80 \text{ or } 44.8 \text{ oz. or } 2 \text{ lbs. } 12.8 \text{ oz.} \end{array}$$

SAMPLE LESSON PLAN

Math Concept: Multiplication and Division of Weights and Measures

Task: Increase and/or Decrease Standardized Recipes

Objective: The student will be able to:

1. Complete basic multiplication facts.
2. Complete basic division facts.
3. Multiply and divide with decimal fractions.
4. Increase and/or decrease standardized recipes.

Teaching Aids:

Chalk
Chalkboard

I. Preparation of the Learner:

If you expect to serve a different number than the recipe calls for, you must convert the recipe to yield what you want.

II. Presentation:

CONCEPT	CLASSROOM ACTIVITY
Increasing and decreasing quantities in standardized recipes	Chalkboard: Lecture on the following using the Teacher Information Sheet. 1. Units of measurement 2. Multiplication 3. Division 4. Decimal fractions Select a standardized recipe and have students practice converting it for: 1. A larger quantity of servings 2. A smaller quantity of servings

III. Application:

Have students complete Skill Builders on the assignment sheet individually or in groups.

IV. Evaluation

TEST - CONVERTING RECIPES

Directions:

Convert this recipe that serves 25 to serve 90.

1. 12 lbs Sugar __________
2. 8 c Milk __________
3. 4 T Vanilla __________
4. 3 oz Butter __________
5. 1/2 c Flour __________
6. 8 1/2 c Brown Sugar __________
7. 10 oz Salt __________
8. 2 t Nutmeg __________
9. 6 lb 4 oz Chocolate __________
10. 3 1/4 c Syrup __________

ASSIGNMENT SHEET

Math Concept: Multiplication and Division of Weights and Measures

Task: Increase and/or Decrease Standardized Recipes

Why learn this?

Conversion of the yield of recipes involves some mathematical skills. Cost control demands that the food service worker be able to convert standardized recipes to yield the number of servings needed.

Principle Emphasized: Multiplication and division of weights and measures.

Words to Know:

Decimal fraction
Factor
Product
Yield

Resources: Information Sheet - Increasing and Decreasing Recipes

---

1. Read the resource
2. Complete Skill Builder - Words to Know
3. Complete Skill Builder - Converting Standardized Recipes

INFORMATION SHEET

INCREASING AND DECREASING RECIPES

To increase or decrease a recipe, multiply the unit of ingredients in a standardized recipe by the factor of increase or decrease.

For example: If the recipe yield is 50 servings and you need 25 servings, you would find the factor of decrease as follows.

$$\frac{25}{50} = \begin{array}{r} .5 \\ 50\overline{)25.0} \end{array}$$ (Factor of Decrease)

6 c Flour = 96 T
96 T Flour x .50 = 96

$$\begin{array}{r} \times\ .5 \\ \hline 48.0 \end{array}$$ T = 3 c

If the recipe yield is 50 and you need 180 servings, you would find the factor of increase as follows.

$$\frac{180}{50} = \begin{array}{r} 3.6 \\ 50\overline{)180.0} \\ 150 \\ \hline 300 \end{array}$$ (Factor of Increase)

6 c Flour = 96 T
96 T Flour x 3.6 = 96

$$\begin{array}{r} 96 \\ \times\ 3.6 \\ \hline 576 \\ 288 \\ \hline 345.6 \end{array}$$ T = 21 1/2 c 1 T

(16 T = 1 c)

SKILL BUILDER

WORDS TO KNOW

Directions:

After looking up the definition to each of the vocabulary words, write a sentence using each word. Each sentence should relate to converting recipes.

1. Decimal fraction____

2. Factor____

3. Product____

4. Yield____

SKILL BUILDER

CONVERTING STANDARDIZED RECIPES

Directions:

Convert these recipes as you have been instructed. Round off the answers to the lowest measure of weight.

I. Convert this recipe that serves 50 to serve 100:

Fruit Salad

Ingredient	Amount for 50	Conversion	Amount for 100
1. Pineapple	6 lb		
2. Peaches	4 lb		
3. Cherries	4 oz		
4. Coconut	8 oz		
5. Oranges	2 lb		
6. Melon	3 lb		

II. Convert this recipe that serves 50 to serve 25:

White Sauce

Ingredient	Amount for 50	Conversion	Amount for 25
1. Milk	4 qt		
2. Flour	1 C		
3. Butter	1 lb		
4. Salt	1-1/2 T		

III. Convert this recipe that serves 50 to serve 75:

Vegetable Beef Soup

Ingredient	Amount for 50	Conversion	Amount for 75
1. Beef Shank	15 lb		
2. Water	4 gal		
3. Bay leaves	2		
4. Salt	3 T		
5. Carrots	1 lb 8 oz		
6. Celery	1 lb 10 oz		
7. Onions	1 lb		
8. Potatoes	2 lb		
9. Pepper	1 t		

IV. Convert this recipe that serves 50 to serve 17:

Filling for Chicken Crepes

Ingredient	Amount for 50	Conversion	Amount for 17
1. Margarine	1 lb 8 oz		
2. Flour	12 oz		
3. Salt	2 T		
4. Chicken Stock	1-1/2 gal		
5. Chicken	10 lb		
6. Mushrooms	1 lb		
7. Worchestershire Sauce	2 T		
8. Curry	3 T		

V. Convert this recipe that serves 10 to feed 45:

Baked Fish

Ingredient	Amount for 10	Conversion	Amount for 45
1. Fillets	10		
2. Butter	2 T		
3. Salt	1/4 t		
4. Flour	1/3 lb		
5. Milk	1 C		

VI. Convert this recipe that serves 25 to serve 300:

Cornbread

Ingredient	Amount for 25	Conversion	Amount for 300
1. Cornmeal	10 oz		
2. Flour	11 oz		
3. Sugar	3 oz		
4. Salt	1/2 oz		
5. Baking Powder	1 oz		
6. Eggs	2		
7. Milk	1 pt		
8. Butter	3 oz		
9. Water	4-1/2 T		

VII. Convert this recipe that serves 50 to serve 150:

Harvard Beets

Ingredient	Amount for 50	Conversion	Amount for 150
1. Beet juice	1-1/2 qt		
2. Bay leaves	1		
3. Cloves	1 t		
4. Sugar	12 oz		
5. Cornstarch	6 oz		
6. Butter	4 oz		
7. Vinegar	2 C		
8. Beets	2 No. 10		

VIII. Convert this recipe that serves 4 to serve 60:

Orange-Glazed Pears

Ingredient	Amount for 4	Conversion	Amount for 60
1. Fresh pears	4		
2. Brown sugar	1 C		
3. Orange juice	1-1/2 C		
4. Lemon juice	1 T		
5. Orange peel	1 t		

IX. Convert this recipe that serves 20 to serve 100:

Cream of Cauliflower Soup

Ingredient	Amount for 20	Conversion	Amount for 100
1. Cauliflower	1 lb		
2. Stock	1 gal		
3. Cream	1 pint		
4. Butter	6 oz		
5. Flour	7 oz		
6. Celery	2 stalks		
7. Onions	1		

X. Convert this recipe that makes 1 cup to prepare 1 gallon:

Buttermilk Dressing

Ingredient	Amount for 1C	Conversion	Amount for 1 gal
1. Mayonnaise	3/4 C		
2. Buttermilk	1/2 C		
3. Parsley flakes	1 t		
4. Onion	1/2 t		
5. Garlic	1 clove		
6. Salt	1/2 t		

XI. Convert this recipe that serves 50 to serve 100:

Chicken & Noodles

Ingredient	Amount for 50	Conversion	Amount for 100
1. Chicken	6 lb		
2. Noodles	2 lb 8 oz		
3. Chicken stock	2 gal		
4. Butter	10 oz		
5. Flour	6 oz		
6. Chicken stock	3 qt		
7. Salt	1 T		

XII. Convert this recipe that serves 50 to serve 150:

Chili Con Carne

Ingredient	Amount for 50	Conversion	Amount for 150
1. Kidney beans	3 lb		
2. Ground beef	9 lb		
3. Onions	8 oz		
4. Tomato puree	1-1/2 qt		
5. Chili powder	2 oz		
6. Cumin seed, ground	3 oz		
7. Salt	3 T		
8. Sugar	2 oz		

XIII. Convert this recipe that serves 10 to serve 40:

Spaghetti Sauce

Ingredient	Amount for 10	Conversion	Amount for 40
1. Tomato puree	1 qt		
2. Water	3/4 C		
3. Onions	4 oz		
4. Bay leaf	1		
5. Thyme	1/4 t		
6. Garlic	1/4 t		
7. Worchestershire	1 T		
8. Cayenne pepper	1/2 t		
9. Salt	1/4 t		

XIV. Convert this recipe that makes 1 gal. to 5 gals:

Medium White Sauce

Ingredient	Amount for 1 gal	Conversion	Amount for 5 gal
1. Milk	4 qt		
2. Flour	8 oz		
3. Butter	1 lb		
4. Salt	1-1/2 T		

XV. Convert this recipe that makes 1 gal. to 1 qt:

Medium White Sauce

Ingredient	Amount for 1 gal	Conversion	Amount for 1 qt
1. Milk	4 qt		
2. Flour	8 oz		
3. Butter	1 lb		
4. Salt	1-1/2 T		

XVI. Convert this recipe that makes 8 pies to make 24:

Strawberry Pie

Ingredient	Amount for 8	Conversion	Amount for 24
1. Pastry	2 lb 8 oz		
2. Strawberries	3 gal		
3. Sugar	3 lb 12 oz		
4. Cornstarch	7-1/2 oz		
5. Lemon juice	3/4 C		

XVII. Convert the recipe that makes 50 servings to make 25:

Lemon Snow

Ingredient	Amount for 50	Conversion	Amount for 25
1. Sugar	1 lb 8 oz		
2. Cornstarch	8 oz		
3. Salt	1/2 t		
4. Water	2 qt		
5. Egg whites	16		
6. Sugar	6 oz		
7. Lemon juice	1 C		
8. Lemon rind	2 T		

XVIII. Convert this recipe that makes 100 cookies to make 750:

Chocolate Chip Cookies

Ingredient	Amount for 100	Conversion	Amount for 750
1. Margarine	6 oz		
2. Sugar	4 oz		
3. Brown sugar	4 oz		
4. Eggs	2		
5. Vanilla	1 t		
6. Flour	10 oz		
7. Salt	1 t		
8. Soda	1 t		
9. Chocolate chips	12 oz		

XIX. Convert this recipe that makes 32 layer cakes to make 1:

Banana Cake

Ingredient	Amount for 32	Conversion	Amount for 1
1. Butter	12 oz		
2. Sugar	1 lb 8 oz		
3. Vanilla	1 T		
4. Bananas	3 C		
5. Eggs	6		
6. Flour	1 lb 8 oz		
7. Salt	1 t		
8. Baking powder	2-1/2 T		
9. Soda	1/2 T		
10. Buttermilk	3/4 C		

XX. Convert this recipe that makes 16 dozen to make 4 dozen.

Plain Rolls

Ingredient	Amount for 16	Conversion	Amount for 4
1. Sugar	1 lb 4 oz		
2. Fat	1 lb 4 oz		
3. Salt	2 oz		
4. Dry milk	6 oz		
5. Eggs	6 oz		
6. Flour	7/8 lb		
7. Water	4 lb		
8. Yeast	10 oz		

XXI. Convert this recipe that serves 25 to serve 100:

Sour Cream Cucumber Salad

Ingredient	Amount for 25	Conversion	Amount for 100
1. Cucumbers	4 lb.		
2. Onions	1-1/2 lb		
3. Sour cream	1 pt		
4. Vinegar	1 pt		
5. Water	1 pt		
6. Salt	1 T		
7. Parsley	1/4 C		
8. Mayonnaise	1 C		

XXII. Convert this recipe that makes 1-1/2 C to make 4-1/2 C:

French Dressing

Ingredient	Amount for 1-1/2	Conversion	Amount for 4-1/2
1. Oil	1 C		
2. Vinegar	1/4 C		
3. Lemon juice	1/4 C		
4. Salt	1 t		
5. Dry mustard	1/2 t		
6. Paprika	1/2 t		

XXIII. Convert the recipe that serves 50 to serve 25:

Reuben Sandwiches

Ingredient	Amount for 50	Conversion	Amount for 25
1. Rye bread	100 slices		
2. 1000 Island dressing	2 C		
3. Corned beef	4 lb		
4. Sauerkraut	1-1/2 qt		
5. Swiss cheese	2 lb		
6. Butter	1 lb		

XXIV. Convert this recipe that serves 50 to serve 300:

Egg Salad Sandwiches

Ingredient	Amount for 50	Conversion	Amount for 300
1. Eggs	3 doz		
2. Mayonnaise	2 C		
3. Pickle relish	2 C		
4. Salt	2 t		
5. Pimiento	1/2 C		
6. Bread	100 slices		

XXV. Convert this recipe that serves 25 to serve 600:

Macaroni Salad

Ingredient	Amount for 25	Conversion	Amount for 600
1. Macaroni	1-1/2 lb		
2. Onion	3 oz		
3. Ground pepper	3 oz		
4. Celery	1 lb		
5. Sweet relish	1 C		
6. Mayonnaise	3 pt		
7. Pimiento	3 oz		
8. Eggs	5		

SKILL BUILDER

ANSWER SHEET

Converting Standardized Recipes

I. 1. 12 lb
2. 8 lb
3. 8 oz
4. 1 lb
5. 4 lb
6. 6 lb

II. 1. 2 qt
2. 4 oz
3. 8 oz
4. 2-1/2 t

III. 1. 22-1/2 lb
2. 6 gal
3. 3
4. 4-1/2 T
5. 3 lb
6. 3 lb 1 oz
7. 1-1/2 lb
8. 3 lb
9. 1-1/2 t

IV. 1. 8 oz
2. 4 oz
3. 2 t
4. 2 qt
5. 3 lb 5 oz
6. 5 T
7. 2 t
8. 1 T

V. 1. 45
2. 1/2 C+1 T (9 T)
3. 1-1/8 t
4. 1 lb. 5 oz.
5. 4-1/2 C

VI. 1. 7 lb 8 oz
2. 8 lb 4 oz
3. 2 lb 4 oz
4. 6 oz
5. 12 oz
6. 24
7. 1-1/2 gal
8. 2 lb 4 oz
9. 3 C + 3 T

VII. 1. 4-1/2 qt
2. 3
3. 3 t
4. 2 lb 4 oz
5. 1 lb 2 oz
6. 12 oz
7. 6 C
8. 6 No 10

VIII. 1. 15
2. 15 C
3. 1 gal 1 qt
1-1/2 pt (22-1/2 C)
4. 15 T
5. 15 t

IX. 1. 5 lb
2. 5 gal
3. 1 qt 1 pt
4. 1 lb 14 oz
5. 2 lb 3 oz
6. 10 stalks
7. 5

X. 1. 12 C
2. 1 qt
3. 16 t (or 5 T, 1 t)
4. 8 t
5. 16 cloves
6. 8 t

XI. 1. 12 lb
2. 5 lb
3. 4 gal
4. 1 lb 4 oz
5. 12 oz
6. 1 gal 2 qt
7. 2 T

XII. 1. 9 lb
2. 27 lb
3. 1 lb 8 oz
4. 1 gal 1 pt
5. 6 oz
6. 9 oz
7. 9 T (1/2 C + 1 T)
8. 6 oz

XIII. 1. 1 gal
2. 2 C
3. 12 oz
4. 4
5. 1 t
6. 1 t
7. 4 t
8. 2 t
9. 1 t

XIV. 1. 5 gal
2. 2 lb 8 oz
3. 5 lb
4. 7-1/2 T

XV. 1. 1 qt
2. 2 oz
3. 4 oz
4. 2-1/4 t

XVI.
1. 7 lb 8 oz
2. 9 gal
3. 5 lb 4 oz
4. 1 lb 6-1/2 oz
5. 2-1/4 C

XVII.
1. 12 oz
2. 4 oz
3. 1/4 t
4. 1 qt
5. 8
6. 3 oz
7. 1/2 C
8. 1 T

XVIII.
1. 2 lb 13 oz
2. 1 lb 14 oz
3. 1 lb 14 oz
4. 14 eggs 4-1/2 T H_2O
5. 2-1/2 T
6. 4 lb 11 oz
7. 2-1/2 T
8. 2-1/2 T
9. 5 lb 10 oz

XIX.
1. 3 oz
2. 8 oz
3. 1 t
4. 1 C
5. 2
6. 8 oz
7. 1/3 t
8. 2-1/2 t
9. 1/2 t
10. 1/4 C

XX.
1. 5 oz
2. 5 oz
3. 1/2 oz
4. 1-1/2 oz
5. 1-1/2 oz
6. 1-1/2 - 2 lb
7. 1 lb
8. 2-1/2 oz

XXI.
1. 16 lb
2. 6 lb
3. 2 qt
4. 2 qt
5. 2 qt
6. 4 T
7. 1 C
8. 4 C

XXII.
1. 3 C
2. 3/4 C
3. 3/4 C
4. 1 T
5. 1-1/2 t
6. 1-1/2 t

XXIII.
1. 50
2. 1 C
3. 2 lb
4. 3/4 qt
5. 1 lb
6. 8 oz

XIV.
1. 18 doz
2. 3 qt
3. 3 qt
4. 4 T
5. 3 C
6. 600

XV.
1. 36 lb
2. 4 lb 8 oz
3. 4 lb 8 oz
4. 24 lb
5. 1-1/2 gal
6. 4-1/2 gal
7. 4 lb 8 oz
8. 10 doz

a bird's eye view

MAKING CHANGE

Understand this math concept:

Addition and multiplication of numbers

Teacher Materials

Information Sheet

Sample Lesson Plan

Student Materials

Assignment Sheet:	Addition and Multiplication of Numbers
Information Sheet:	Sales Tax Chart
Skill Builders:	Words to Know Making Change Adding Sales Tax

TEACHER INFORMATION SHEET

Understand this math concept:

Addition and multiplication of numbers

Addition of Numbers

Two numbers expressed as dollars and cents are added like whole and decimal numbers.

$$\begin{array}{r} \$1.32 \\ +\ \underline{5.36} \end{array}$$

Dollars	Cents
$\begin{array}{r} 1 \\ +\underline{5} \\ 6 \end{array}$	$\begin{array}{r} 32 \\ +\underline{36} \\ 68 \end{array}$

Making Change

Making change is accomplished not by subtracting, but by adding.

For Example: 39¢ from $1.00 = 61¢ change.

Think!
1 penny makes 40¢
1 dime makes 50¢
2 quarters makes $1.00

OR

$3.98 from $20.00 = $16.02 change

Think!
2 pennies makes $4.00
1 dollar makes $5.00
5 dollars makes $10.00
10 dollars makes $20.00

Multiplication of Money

Sometimes people purchase more than one of the same item such as three packages of hot dogs at $1.79 each or four shirts at $11.95 each. Then it is necessary to multiply the original cost times the number of items purchased. For instance:

$1.79
x 3

Dollars	Cents
1	79
x	3
5	37

$11.21
x 3

$18.00
x 4

$19.10
x 8

$16.21
x 7

SAMPLE LESSON PLAN

Math Concept: Addition and Multiplication
Task: Making Change

Objective: The student will be able to:

1. Add numbers expressed in dollars and cents.
2. Determine the amount of change in a sales transaction.
3. Multiply a monetary amount by a given number.

Teaching Aids:

Chalk
Chalkboard
Play Money

I. Preparation of the Learner:

After you have added the guest check, you will accept the customer's payment. If more money is presented than the actual check, you must make change.

II. Presentation:

CONCEPT	CLASSROOM ACTIVITY
Addition of Money	Chalkboard Talk: Use Teacher Information Sheet.
Making Change	Chalkboard Activity: Make change with the fewest bills and coins.

Amt. of Check	Payment Given	1¢	5¢	10¢	25¢	1.00	5.00
$1.23	$2.00						
$1.89	$5.00						
$3.41	$5.00						
$5.82	$10.00						
$9.61	$10.00						

CONCEPT	CLASSROOM ACTIVITY
Multiplication of Money	Display three equal amounts of money and add to obtain total sum. Demonstrate on chalkboard that multiplication is faster and easier.

III. Application:

Have students complete Skill Builders on the assignment sheet individually or in groups.

IV. Evaluation

TEST - MAKING CHANGE

Directions:

Determine the most appropriate change for the following.

Amt. of Check	Payment Given	Total Change	1¢	5¢	10¢	25¢	$1.00	$5.00	$10.00	$20.00
$6.98	$10.00									
$4.21	$10.00									
$10.82	$11.00									
$9.41	$20.00									
$15.43	$50.00									
$18.41	$20.00									

ASSIGNMENT SHEET

Math Concept: Addition and Multiplication

Task: Making Change

Why learn this?

Making change is often a necessary step in receiving payment for goods and services. For good customer relations, it is important that you be able to perform this task quickly and correctly.

Principle Emphasized: Addition and multiplication of numbers

Words to Know:

Change
Guest Check
Sales Tax

Resources: Information Sheet: Sales Tax Chart

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1. Read the resource
2. Complete Skill Builder - Words to Know
3. Complete Skill Builder - Making Change
4. Complete Skill Builder - Adding Sales Tax

INFORMATION SHEET

SALES TAX CHART

FOR USE ON OR AFTER 11-25-81

OHIO'S BRACKETED TAX COLLECTION SCHEDULE SALES & USE TAX FOR STATE, COUNTY AND OR TRANSIT TAX – TOTAL 5 1/2% TAX LEVY

SALES 15¢ AND UNDER – NO TAX

Each Sale	Tax	Each Sale	Tax
.16 to .18	.01	8.19 to 8.36	.46
.19 to .36	.02	8.37 to 8.54	.47
.37 to .54	.03	8.55 to 8.72	.48
.55 to .72	.04	8.73 to 8.90	.49
.73 to .90	.05	8.91 to 9.09	.50
.91 to 1.09	.06	9.10 to 9.27	.51
1.10 to 1.27	.07	9.28 to 9.46	.52
1.28 to 1.46	.08	9.47 to 9.64	.53
1.47 to 1.64	.09	9.65 to 9.82	.54
1.65 to 1.82	.10	9.83 to 10.00	.55
1.83 to 2.00	.11	10.01 to 10.18	.56
2.01 to 2.18	.12	10.19 to 10.36	.57
2.19 to 2.36	.13	10.37 to 10.54	.58
2.37 to 2.54	.14	10.55 to 10.72	.59
2.55 to 2.72	.15	10.73 to 10.90	.60
2.73 to 2.90	.16	10.91 to 11.09	.61
2.91 to 3.09	.17	11.10 to 11.27	.62
3.10 to 3.27	.18	11.28 to 11.46	.63
3.28 to 3.46	.19	11.47 to 11.64	.64
3.47 to 3.64	.20	11.65 to 11.82	.65
3.65 to 3.82	.21	11.83 to 12.00	.66
3.83 to 4.00	.22	12.01 to 12.18	.67
4.01 to 4.18	.23	12.19 to 12.36	.68
4.19 to 4.36	.24	12.37 to 12.54	.69
4.37 to 4.54	.25	12.55 to 12.72	.70
4.55 to 4.72	.26	12.73 to 12.90	.71
4.73 to 4.90	.27	12.91 to 13.09	.72
4.91 to 5.09	.28	13.10 to 13.27	.73
5.10 to 5.27	.29	13.28 to 13.46	.74
5.28 to 5.46	.30	13.47 to 13.64	.75
5.47 to 5.64	.31	13.65 to 13.82	.76
5.65 to 5.82	.32	13.83 to 14.00	.77
5.83 to 6.00	.33	14.01 to 14.18	.78
6.01 to 6.18	.34	14.19 to 14.36	.79
6.19 to 6.36	.35	14.37 to 14.54	.80
6.37 to 6.54	.36	14.55 to 14.72	.81
6.55 to 6.72	.37	14.73 to 14.90	.82
6.73 to 6.90	.38	14.91 to 15.09	.83
6.91 to 7.09	.39	15.10 to 15.27	.84
7.10 to 7.27	.40	15.28 to 15.46	.85
7.28 to 7.46	.41	15.47 to 15.64	.86
7.47 to 7.64	.42	15.65 to 15.82	.87
7.65 to 7.82	.43	15.83 to 16.00	.88
7.83 to 8.00	.44	16.01 to 16.18	.89
8.01 to 8.18	.45	16.19 to 16.36	.90

SKILL BUILDER

WORDS TO KNOW

Directions:

Explain a sales transaction using the following terms:

Change

Guest Check

Sales Tax

SKILL BUILDER

MAKING CHANGE

I. Directions:

Each of the 6 squares on the following page lists the amount of the guest check and the amount paid by the customer. Your problem is to: a) tell what you would say in accepting payment, b) select the correct change in coins and bills and count back the change correctly to the customer, c) tell what you would say in closing, d) write the correct amount of change returned. The first square is completed for you as an example.

GUEST CHECK AMT: $1.20 PAYMENT: $2.00

[a]What you say as you receive payment:

"$1.20 please. That is $1.20 from $2.00

[b]Present Change to Patron:	Coins Counted
"One twenty-five"	.05
"One fifty"	.25
"One seventy-five"	.25
"and two dollars"	.25
[c]End: "Thank you."	[d]T. Change .80

GUEST CHECK AMT: $2.65 PAYMENT: $10.00

What you say as you:

[a]receive payment:

[b]Present Change to Patron: Coins Counted

[c]End: (1)

[d]T. Change

GUEST CHECK AMT: $1.05 $2.00

What you say as you:

[a]receive payment:

[b]Present Change to Patron: Coins Counted

[c]End: (2)

[d]T. Change

GUEST CHECK AMT: $2.35 PAYMENT: $5.50

What you say as you:

[a]receive payment:

[b]Present Change to Patron: Coins Counted

[c]End (3)

[d]T. Change

GUEST CHECK AMT: $.45 PAYMENT: $1.00

What you say as you:

[a]receive payment:

Present Change to Patron: Coins Counted

[c]End: (4)

[d]T. Change

GUEST CHECK AMT: NO SALE PAYMENT: ____

What you say as you: Change for $1.00

[a]receive payment:

Present Change to Patron: Coins Counted

[c]End: (5)

[d]T. Change

II. **Directions**: Using the fewest number of coins and bills, indicate the amount of change to be returned for each of the following transactions:

	Amount of Sale	Amount Tendered	DENOMINATIONS						Total Change
			.01	.05	.10	.25	1.00	5.00	
1.	$2.73	$ 5.00	2			1	2		$2.27
2.	.27	.50							
3.	1.29	5.00							
4.	.81	1.00							
5.	.39	10.00							
6.	.21	.50							
7.	7.57	10.00							
8.	3.02	5.00							
9.	2.76	10.00							
10.	1.57	5.00							
11.	2.15	5.00							
12.	5.55	6.05							
13.	3.13	5.13							
14.	2.73	10.00							
15.	.75	5.00							
16.	6.95	10.00							
17.	1.50	5.00							
18.	.75	1.00							
19.	.90	5.00							
20.	3.72	10.75							
21.	1.27	1.50							
22.	.92	1.00							
23.	1.83	20.00							

III. **Directions:** In this exercise, you are to 1) calculate the amount of each transaction, 2) compute the sales tax based on the Information Sheet, Sales Tax Chart, 3) determine the total sale, including sales tax, and 4) compute the change:

	(1)	(2)	(3)		(4)							
Individual Items Purchased	Sub-total	Sales Tax	Total	Amount Tendered	.01	.05	.10	.25	1.00	5.00	10.00	Total Change
1. .25, .50, 1.75	2.50	.14	2.64	5.00	1		1	1	2			$2.36
2. .20, 1.10, 2.50, .35				5.00								
3. .10, .95, .75, 1.50				5.00								
4. 1.25, 1.95, .50, .25				5.00								
5. 2.75, .20, .55				5.00								
6. .80, .20				5.00								
7. .30, .69, .25, 1.00				5.00								
8. 1.85, .50, .35				10.00								
9. 4.75, .65, .95				10.00								
10. .65, .45, .35, 1.80				10.00								
11. 1.10, .45, .89, 3.75				10.00								
12. 2.00, .85, .40, .30				10.00								
13. 1.30, .60, .50, .25				10.00								
14. .85, .49, .69, 1.10				20.00								
15. 1.10, .95, .95, .85				20.00								
16. 1.75, 2.00, 1.75				20.00								
17. 3.25, .85, .95, 1.00				20.00								
18. .75, 1.20, 1.25				20.00								
19. .95, 2.50, .50				20.00								
20. 1.50, .75, .80				20.00								

IV. **Directions:** List the amount of 1) sales tax which must be added to each of the following guest bills, 2) total the bill, and 3) determine customer change from a $20.00 bill. Refer to the Sales Tax Chart.

Amount of Bill	(1) Sales Tax	(2) Total	(3) Change
1. $1.20			
2. 5.55			
3. 3.89			
4. 4.98			
5. 4.40			
6. 2.35			
7. 5.28			
8. 2.70			
9. .15			
10. 2.98			
11. .28			
12. 6.50			
13. .45			
14. .25			
15. 3.80			
16. 6.10			
17. 3.28			
18. 1.75			
19. 1.98			
20. 3.50			

SKILL BUILDERS

ANSWER SHEET

Making Change - Items I-IV

I.

GUEST CHECK AMT: $1.20 PAYMENT: $2.00

[a]What you say as you receive payment:
"$1.20 please. That is $1.20 from $2.00"

[b]Present Change to Patron:	Coins Counted
"One twenty-five"	.05
"One fifty"	.25
"One seventy-five"	.25
"and two dollars"	.25
[c]End: "Thank you."	[d]T. Change .80

GUEST CHECK AMT: $2.65 PAYMENT: $10.00

What you say as you: "$2.65 please. That
[a]receive payment: is $2.65 out of $10.00."

[b]Present Change to Patron:	Coins Counted
"Two seventy-five"	.10
"Three"	.25
"Four"	1.00
"Five"	1.00
"and five makes ten."	5.00
[c]End: "Thank you." (1)	[d]T. Change $7.35

GUEST CHECK AMT: $1.05 $2.00

What you say as you: "$1.05 please. That
[a]receive payment: is $1.05 out of $2.00."

[b]Present Change to Patron:	Coins Counted
"One fifteen"	.10
"One twenty-five"	.10
"One fifty"	.25
"One seventy-five"	.25
"and two."	.25
[c]End: "Thank you." (2)	[d]T. Change .95

GUEST CHECK AMT: $2.35 PAYMENT: $5.00

What you say as you: "$2.35 please. That
[a]receive payment: is $2.35 out of $5.00."

[b]Present Change to Patron:	Coins Counted
"Two forty"	.05
"Two fifty"	.10
"Two seventy-five"	.25
"Three"	.25
"Four"	1.00
"and five."	1.00
[c]End "Thank you." (3)	[d]T. Change $2.35

GUEST CHECK AMT: $.45 PAYMENT: $1.00

What you say as you: "$.45 please. That
[a]receive payment: is $.45 out of $1.00."

Present Change to Patron:	Coins Counted
"Fifty"	.05
"Seventy-five"	.25
"and one."	.25
[c]End: "Thank you." (4)	[d]T. Change .55

GUEST CHECK AMT: NO SALE PAYMENT: ____

What you say as you: Change for $1.00
[a]receive payment: "Change for $1.00."

Present Change to Patron:	Coins Counted
"Ten"	.10
"Twenty"	.10
"Twenty-five"	.05
"Fifty"	.25
"Seventy-five"	.25
"and one."	.25
[c]End: "Thank you." (5)	[d]T. Change $1.00

II.

	Amount of Sale	Amount Tendered	DENOMINATIONS						Total Change
			.01	.05	.10	.25	1.00	5.00	
1.	$2.73	$ 5.00	2			1	2		$2.27
2.	.27	.50	3		2				$ .23
3.	1.29	5.00	1		2	2	3		$3.71
4.	.81	1.00	4	1	1				$ .19
5.	.39	10.00	1		1	2	4	1	$9.61
6.	.21	.50	4			1			$ .29
7.	7.57	10.00	3	1	1	1	2		$2.43
8.	3.02	5.00	3		2	3	1		$1.98
9.	2.76	10.00	4		2		2	1	$7.24
10.	1.57	5.00	3	1	1	1	3		$3.43
11.	2.15	5.00			1	3	2		$2.85
12.	5.55	6.05				2			$ .50
13.	3.13	5.13					2		$2.00
14.	2.73	10.00	2			1	2	1	$7.27
15.	.75	5.00				1	4		$4.25
16.	6.95	10.00		1			3		$3.05
17.	1.50	5.00				2	3		$3.50
18.	.75	1.00				1			$ .25
19.	.90	5.00			1		4		$4.10
20.	3.72	10.75	3				2	1	$7.03
21.	1.27	1.50	3		2				$ .23
22.	.92	1.00	3	1					$ .08
23.	1.83	20.00	2	1	1		3	3	$18.17

III.

	(1)	(2)	(3)		(4)							
Individual Items Purchased	Sub-total	Sales Tax	Total	Amount Tendered	.01	.05	.10	.25	1.00	5.00	10.00	Total Change
1. .25, .50, 1.75	2.50	.14	2.64	5.00	1		1	1	2			$2.36
2. .20, 1.10, 2.50, .35	4.15	.23	4.38	5.00	2		1	2				$ .62
3. .10, .95, .75, 1.50	3.30	.19	3.49	5.00	1			2	1			$1.51
4. 1.25, 1.95, .50, .25	3.95	.22	4.17	5.00	3	1		3				$ .83
5. 2.75, .20, .55	3.50	.20	3.70	5.00			3		1			$1.30
6. .80, .20	1.00	.06	1.06	5.00	4	1	1	3	3			$3.94
7. .30, .69, .25, 1.00	2.24	.13	2.37	5.00	3		1	2	2			$2.63
8. 1.85, .50, .35	2.70	.15	2.85	10.00		1	1		2	1		$7.15
9. 4.75, .65, .95	6.35	.35	6.70	10.00			3		3			$3.30
10. .65, .45, .35, 1.80	3.25	.18	3.43	10.00	2	1		2	1	1		$6.57
11. 1.10, .45, .89, 3.75	6.19	.35	6.54	10.00	1		2	1	3			$3.46
12. 2.00, .85, .40, .30	3.55	.20	3.75	10.00				1	1	1		$6.25
13. 1.30, .60, .50, .25	2.65	.15	2.80	10.00			2		2	1		$7.20
14. .85, .49, .69, 1.10	3.13	.18	3.31	20.00	4	1	1	2	1	1	1	$16.69
15. 1.10, .95, .95, .85	3.85	.22	4.07	20.00	3	1	1	3		1	1	$15.93
16. 1.75, 2.00, 1.75	5.50	.31	5.81	20.00	4	1	1		4		1	$14.19
17. 3.25, .85, .95, 1.00	6.05	.34	6.39	20.00	1		1	2	3		1	$13.61
18. .75, 1.20, 1.25	3.20	.18	3.38	20.00	2		1	2	1	1	1	$16.62
19. .95, 2.50, .50	3.95	.22	4.17	20.00	3	1		3		1	1	$15.83
20. 1.50, .75, .80	3.05	.17	3.22	20.00	3			3	1	1	1	$16.78

IV.

Amount of Bill	(1) Sales Tax	(2) Total	(3) Change
1. $1.20	$ .07	$1.27	$18.73
2. 5.55	.31	5.86	14.14
3. 3.89	.22	4.11	15.89
4. 4.98	.28	5.26	14.74
5. 4.40	.25	4.65	15.35
6. 2.35	.13	2.48	17.52
7. 5.28	.30	5.58	14.42
8. 2.70	.15	2.85	17.15
9. .15	0	.15	19.85
10. 2.98	.17	3.15	16.85
11. .28	.02	.30	19.70
12. 6.50	.36	6.86	13.14
13. .45	.02	.47	19.53
14. .25	.02	.27	19.73
15. 3.80	.21	4.01	15.99
16. 6.10	.34	6.44	13.56
17. 3.28	.19	3.47	16.53
18. 1.75	.10	1.85	18.15
19. 1.98	.11	2.09	17.91
20. 3.50	.20	3.70	16.30

SKILL BUILDER

ADDING SALES TAX

Directions:

Use the Sales Tax Chart to figure the tax, add tax to the bill, and determine total change.*

Amount of Bill	(1) Sales Tax	(2) Total	(3) Change
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			
16.			
17.			
18.			
19.			
20.			

*Teacher will supply guest checks.

a bird's eye view

MEASURING FOR DRAPERIES AND CURTAINS

Understand this math concept:

Calculating, multiplying, and dividing units of measure.

Teacher Materials
Information Sheet
Sample Lesson Plan

Student Materials

Assignment Sheet:	Measuring for Draperies and Curtains
Information Sheet:	Window Talk
Skill Builders:	Words to Know Size It Up Measure Up

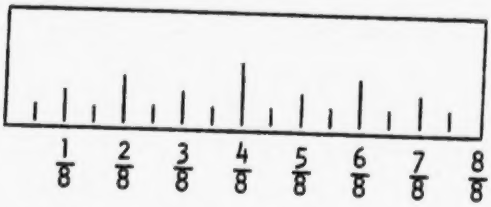
TEACHER INFORMATION SHEET

Understand this math concept:

Calculating, multiplying, and dividing units of measure.

Unit of Measure

An inch is a standard unit of measure. It is divided into fractional units.



A measurement is more precise when a smaller unit of measure is used.

$\frac{2}{8} = \frac{1}{4}$

$\frac{4}{8} = \frac{2}{4} = \frac{1}{2}$

$\frac{6}{8} = \frac{3}{4}$

$\frac{8}{8} = 1$

Multiplying Units of Measure

$$\begin{array}{r} 4 \text{ ft. } 5 \text{ in.} \\ \times \quad 5 \\ \hline 20 \text{ ft. } 25. \text{ in} \end{array} = 22 \text{ ft. } 1 \text{ in.}$$

$$\begin{array}{r} 6 \text{ ft. } 2 \text{ in.} \\ \times \quad 22 \\ \hline 132 \text{ ft. } 44 \text{ in.} \end{array} = 135 \text{ ft. } 8 \text{ in.}$$

2 1/2 inches × 5 = $\frac{5}{2} \times \frac{5}{1} = \frac{25}{2}$ = 12 1/2 inches or 1 ft. 1/2 in.

6 1/3 inches × 6 = $\frac{19}{3} \times \frac{6}{1} = \frac{114}{3}$ = 38 inches or 3 ft. 2 in.

Dividing Units of Measure

$$\begin{array}{rl} & 4 \text{ ft. } 4 \text{ in.} \\ 2 & \overline{)\,8 \text{ ft. } 8 \text{ in.}} \end{array}$$

$$\begin{array}{rl} & 8 \text{ ft.} \\ 3 & \overline{)\,26 \text{ ft. } 3 \text{ in.}} \\ & \underline{24 \text{ ft.}} \\ & 2 \text{ ft. } 3 \text{ in.} \end{array}$$

(24 in. + 3 in. = 27 in.)
or 10 ft. 3 in.

2 1/2 inches ÷ 4 = $\frac{5}{2} \div \frac{1}{4} = \frac{5}{8}$ inches

6 3/4 inches ÷ 5 = $\frac{27}{4} \div \frac{1}{5} = \frac{27}{20}$ = 1 2/20 inches   1 2/20 = 1 1/10

SAMPLE LESSON PLAN

Math Concept: Calculating, Multiplying, and Dividing
Task: Measuring for Draperies and Curtains

Objective: The students will be able to:

1. Make accurate linear measurements.
2. Multiply and divide yards, feet, and inches.
3. Take accurate measurements for curtains and draperies.

Teaching Aids:

Masking tape
Yardsticks
Pictures illustrating different measurement techniques

I. Preparation of the Learner:

Accurate window measurements are essential in the purchasing of fabric and sewing of curtains and draperies.

II. Presentation:

CONCEPT	CLASSROOM ACTIVITY
Measuring	Chalkboard: Review measurements including fractions of an inch, foot, and yard.
Demonstration of measurement	Demonstration: Measure a window in class (use Student Information Sheet). Measure length: 1) rod to sill ____ 2) rod to apron ____ 3) rod to floor ____ Measure width: Window with traverse rod, 4" return, 3" overlap. A window may be simulated by marking it off with masking tape on the wall.
Multiplying and dividing units of measure	Give each student 5 objects to measure. Exchange the 5 objects with a classmate to check measurements for accuracy. Chalkboard: Review multiplying and dividing units of measure from Teacher Information Sheet.

III. Application:

Have students complete Skill Builders on the assignment sheet individually or in groups.

IV. Evaluation

TEST - MULTIPLYING AND DIVIDING UNITS OF MEASURE

Directions:

Multiply problems 1 through 5

1. 15 yds. 2 ft. × 9
2. 8 ft. 9 in. × 7
3. 3 ft. 5 in. × 9
4. 19 ft. 9 in. × 3
5. 16 yd. 1 ft. × 4

Directions:

Divide problems 6 through 10

6. $8\overline{)25 \text{ ft. } 4 \text{ in.}}$
7. $5\overline{)21 \text{ yds. } 2 \text{ ft.}}$
8. $2\overline{)13 \text{ yds. } 1 \text{ ft.}}$
9. $3\overline{)18 \text{ yds. } 2 \text{ ft.}}$
10. $6\overline{)1 \text{ ft. } 6 \text{ in.}}$

ASSIGNMENT SHEET

Math Concept: Calculating, Multiplying, and Dividing

Task: Measuring for Draperies and Curtains

Why learn this?

The following information will enable you to take the measurements needed to figure the yardage required for custom draperies, sheers, and curtains. These same measurements are necessary when selecting ready-made window treatments.

Principle Emphasized:

Calculating, multiplying, and dividing units of measure.

Words to Know:

Apron
Baseboard
Finished Width
Finished Length
Heading
One-way Draw
Overlap
Panel
Return
Sill
Stackback
Traverse Rod
Two-way Draw

Resources: Information Sheet - Window Talk

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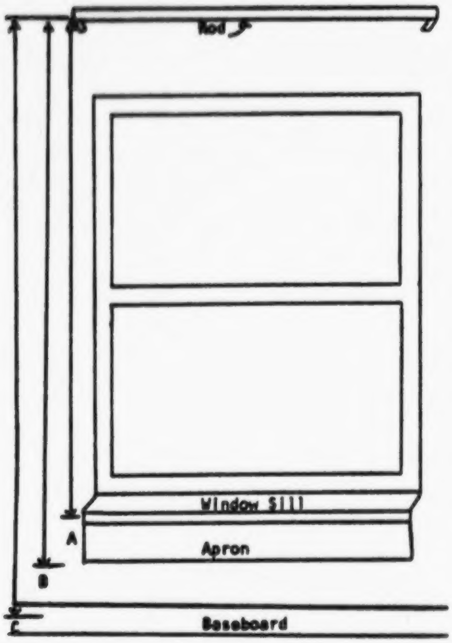
1. Read the resource
2. Complete Skill Builder - Words to Know
3. Complete Skill Builder - Size It Up
4. Complete Skill Builder - Measure Up

INFORMATION SHEET

WINDOW TALK

Before measuring for fabric, you must know where the curtain or drapery rod, or shade hardware, will be placed on your window. Hardware includes rods, hooks, and tie back holders.

Evaluate the hardware before you start to measure because its dimensions will affect your calculations.



How Long Will The Draperies Be?

FROM THE ROD: A - to the sill
B - to the lower edge of the apron
C - to the floor (allowing about 1/2 inch to clear carpeting)

SILL - Horizontal bottom piece of a window frame, often forming a narrow shelf.

APRON - Decorative molding beneath window sill.

Windows in many newer houses do not have an apron. Measure 4 inches below the window in this case.

The more popular length for a short drape is 4 inches below the window. This brings the hemline below the sill so that light doesn't show the hemline inside.

Your rods should be placed at least 4 inches above the window so the hooks will not show from the outside.

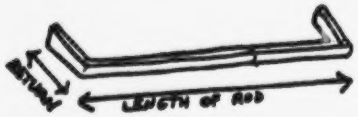
Allow space on the side for pullback so the drapes will clear the window. You can figure you will need six inches per width of fabric. This is called stackback.

The finished length is the length measurement of the finished drapery including hardware allowances.

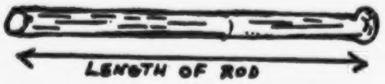
The finished width is the overall width measurement of the finished drapery including overlap, return, and stackback.

Measuring the finished width is a simple task, but it varies slightly depending on the style of window covering and hardware that you are using.

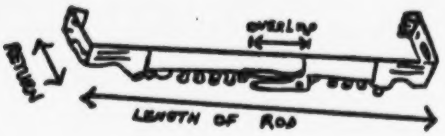
Curtains and Draperies



To find the finished width for curtains and draperies, just measure the length of the rod with a steel tape measure. Then add measurements for returns and overlaps, if there are any. On a standard traverse rod, the overlap is three inches on each side and the return is four inches on each side.



Two panel curtains that are hung from flat or cafe curtain rods do not have provision for overlap, you must add 3 1/2 inches to the finished width measurement. Traverse rods have a built-in overlap, so the measurement is more obvious.

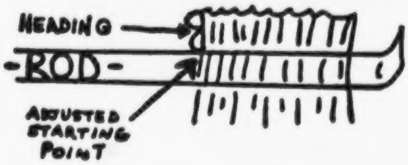


RETURN - The distance the rod projects from the wall.

OVERLAP - The distance at the center of a two panel treatment where one panel laps the other.

PANEL - A single unit of a window treatment which may consist of a single fabric width or two or more widths seamed together.

To measure the finished length, you need to know exactly where the treatment will start and end. These boundaries are determined by the style of covering and hardware you have chosen and by your placement of the hardware.



FOR CURTAINS AND DRAPERIES you begin measuring the finished length at the top of the rod; for shades, at the top of the roller. The starting point must be adjusted in the case of curtains and draperies to allow for headings, rings, or ceiling mounts.

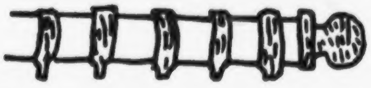
HEADING - The top of the window treatment.

GATHERED HEADINGS, measure up from the top of the rod a distance equal to the desired heading.

FOR CURTAINS HUNG BY RINGS, the adjusted starting point is the bottom of the ring. (If hardware is not yet installed, measure from the point marked for the top of the rod to the sill, apron, or floor; then subtract the ring's diameter to find the finished length.)

WALL OR FRAME MOUNTED traverse rods, measure from a point 1/2 inch above the rod.

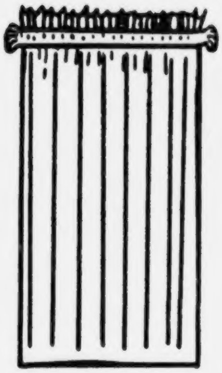
CEILING MOUNTED traverse treatments, measure from a point 1/4 inch below top of rod.



DECORATIVE traverse rods, measure from the bottom of the ring. (If hardware is not yet installed, measure as for curtain rings above.)

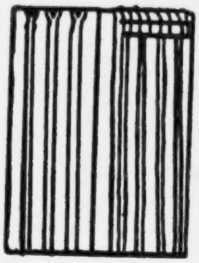
Basic Rules for Measuring

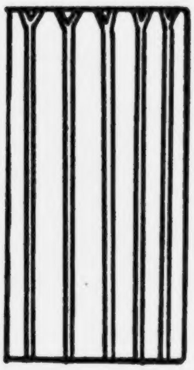
1. Always take measurements with a steel tape measure or a carpenter's rule; cloth tapes can stretch.
2. Write down all measurements as you take them, then recheck your measurements.
3. Measure every window even if some appear to be the same size.
4. Measure the width of the treatment you plan. If it has an overlap and/or return, add that measurement to the width (usually 3 inches for overlap and 4 inches for return for each panel unless your draperies are one-way draw).



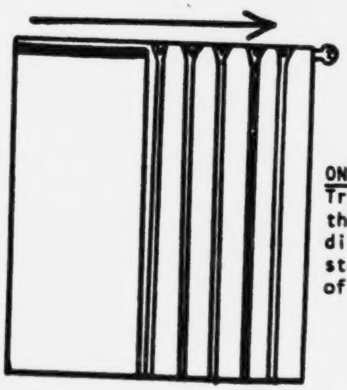
CURTAIN - Stationary window covering that is attached to a rod with hooks, rings, or fabric tabs, or has a rod pocket through which the rod is inserted.

CLASS CURTAINS - Used primarily to diffuse light and to provide a measure of privacy during the daytime hours; made from sheer fabrics. They hang directly in front of the glass and add elegance to any room.

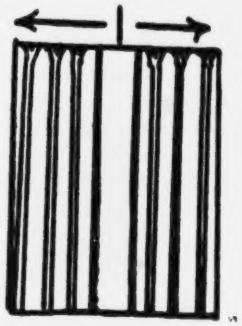




DRAPERY - A pleated window covering that is attached to a rod by rings or hooks and may or may not traverse; traverse draperies move by means of a pulley cord system.



ONE-WAY DRAW
Traverse draperies that open in one direction with stackback on one side of the glass area.



TWO-WAY DRAW - Traverse draperies opening from the center out to the sides with stackback on both sides of the glass area.

SKILL BUILDER

WORDS TO KNOW

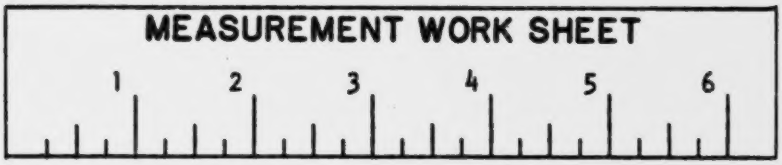
Directions:

Write a definition for each of the following vocabulary words.

1. Apron ____________________
2. Baseboard ____________________
3. Finished Length ____________________
4. Finished Width ____________________
5. Heading ____________________
6. One-way Draw ____________________
7. Overlap ____________________
8. Panel ____________________
9. Return ____________________
10. Sill ____________________
11. Stackback ____________________
12. Traverse Rod ____________________
13. Two-way Draw ____________________

SKILL BUILDER

SIZE IT UP



1. List 4 rules to remember when measuring for draperies.

   a.
   b.
   c.
   d.

2. Draperies can be measured to 3 different lengths. What are the 3 lengths?

   a.
   b.
   c.

3. If a window does not have an apron, how many inches below the window sill do you measure for "rod to apron" length?

4. Why should a traverse rod be mounted at least 4 inches above the window pane?

5. How do differences in window hardware affect the finished length of curtains or draperies?

6. What is the allowance for stackback on any window?

SKILL BUILDER

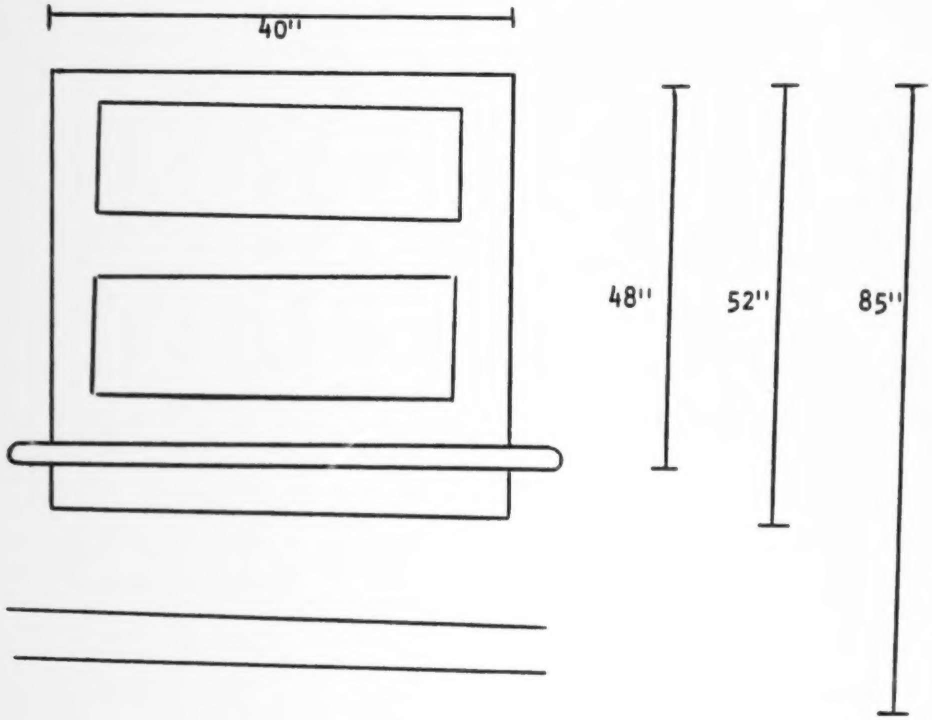
MEASURE UP

Directions:

Read the three situations and answer the questions that follow.

Situation 1

Mrs. Miller would like floor length draperies on a traverse rod with a 4 inch return, 3 inch overlap, and a 12 inch stackback.



1. Where should the traverse rod be mounted on the wall? ____________________

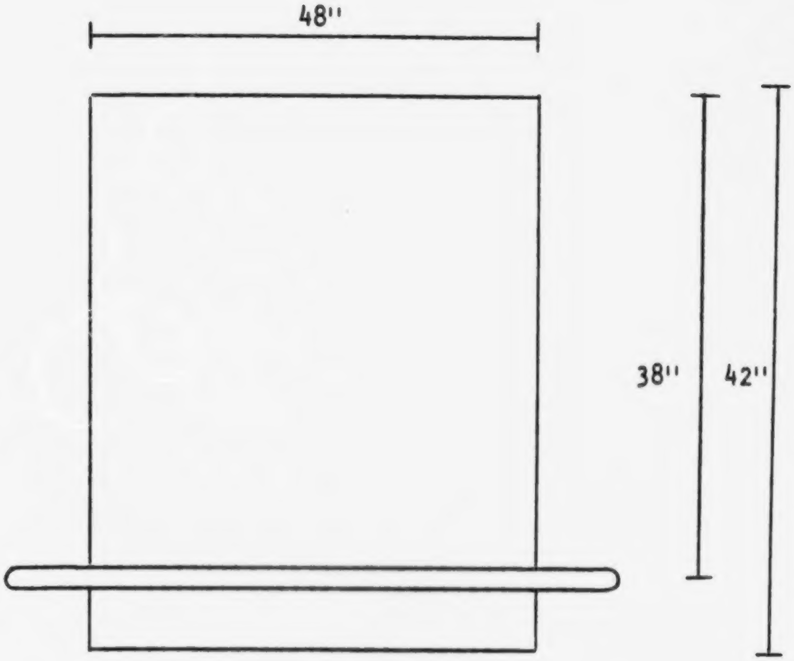
   ____

2. What is the finished length? ____

3. What is the overall finished width of the draperies? ____________________

Situation 2

Mrs. Smith's window will have curtains hung by rings 2" in diameter on a decorative rod placed at the top of the window frame. The return is 4". The curtains will end at the bottom of the apron.

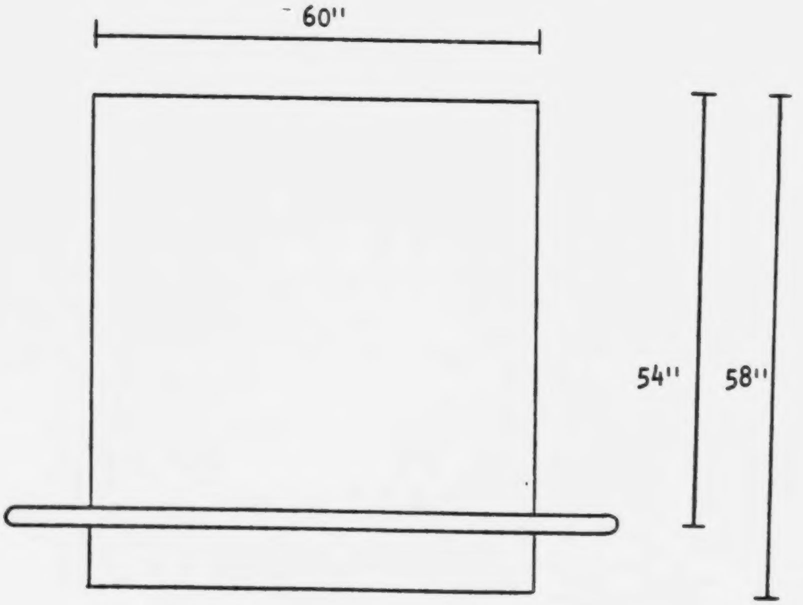


1. What is the finished length?____________________________

2. What is the overall finished width?______________________

Situation 3

Mr. Warner would like apron length draperies on a decorative traverse rod. The rings on the rod are 1 1/2 inches in diameter, overlap is 3 inches, return is 5 inches, and stackback is 18 inches.



1. Where should the decorative traverse rod be mounted on the wall?

2. What is the overall width?

3. What is the finished length?

SKILL BUILDERS

ANSWER SHEET

Size It Up

1. a. Always take measurements with a steel tape measure or a carpenter's rule; cloth tapes can stretch.
   b. Write down all measurements as you take them. Then recheck your measurements.
   c. Measure every window, even if they appear to be the same size.
   d. Measure the width of the treatment you plan. If it has an overlap and/or return, add that measurement to the width.

2. a. From the rod to the sill
   b. From the rod to the lower edge of the apron
   c. From the rod to the floor (allowing about 1/2" to clear the carpeting)

3. 4"

4. So the hooks will not show from the outside.

5. The finished length is the length measurement of the finished drapery including hardware allowance.

6. Six inches per width of fabric.

Measure Up

Situation 1

1. 52" or 6" on both sides of the window frame.

2. 84 1/2" (minus 1/2" to clear the floor--length may be longer if rods need to be placed above the window frame so that hooks cannot be seen from the outside).

3. 63"

Window width	40"
Stackback	12"
Return 2 @ 4	8"
Overlap	3"
	63"

Situation 2

1. 40"

Top to bottom apron	42"
Less 2" drop for ring	2"
	40"

2. 56"	Window width	48"
	Return 2 @ 4	8"
		56"

Situation 3

1. 4" above the window so that rings, hooks, and headings will not show to the outside.

   78" wide or 9" on both sides of window frame.

2. 91"	Window width	60"
	Stackback	18"
	Return 2 @ 5	10"
	Overlap	3"
		91"
3. 87 1/2"	Top of window to floor	84"
	Plus 4" to conseal heading	4"
		88"
	Minus 1/2" to clear floor	1/2"
		87 1/2"

a bird's eye view

MEASURING TIME

Understand this math concept:

Units of time are given meaning by word descriptions and numbers.

Teacher Materials

Information Sheet
Sample Lesson Plan

Student Materials

Assignment Sheet:	Teach the Concept of Time
Information Sheet:	Measuring Time
Skill Builders:	Words to Know Telling Time Teaching Time Measurement

TEACHER INFORMATION SHEET

Understand this math concept:

Units of time are given meaning by word descriptions and numbers.

YOUNG CHILDREN'S TYPICAL QUESTIONS ABOUT TIME

Is today a long time? When will it be tomorrow? When is it today? How old will I be when I'm forty? How much time is 10 o'clock? What does 4:30 mean?

Studies by Piaget indicate that a child's ability to conceptualize uniform increments of time comes much later than the ability to deal with sequence.

Increments of Time:	Minutes, Hours, Days, Weeks, Years, Some time ago, In a little while
Sequence:	First, Next, Last, Sooner, Later, Before, After

In preschool it is more desirable to help children develop time concepts based on sequence than on increments of time. In the preschool there will be many opportunities to learn sequences of time based on what currently is happening, what has already happened,and what is going to happen next. If you tell a child something will happen in an hour, it has little meaning. If you identify an event that is familiar to the child, such as story time, you can explain, "We will have our snack after story time." This will have meaning to the preschool child.

Examples of teacher expressions that relate ideas of time sequence to preschool children are:

When you go home at 11 o'clock...
This morning...
Right now we will... Later we will...
Before you eat...
Next time...
When you finish eating...
Tonight, after dinner...

Robert D. Hess and Doreen J. Croft, Teachers of Young Children (Boston: Houghton-Mifflin, 1972).

SAMPLE LESSON PLAN

Math Concept: Measuring Time
Task: Teach the Concept of Time

Objective: The student will be able to:

1. Teach and reinforce premath concepts to young children through the preschool program
2. Incorporate the element of time into projects with the preschool children

---

Teaching Aids:

Chalkboard
Chalk

I. Preparation of the Learner:

There are many aspects of measurement involved in building a program to develop premath concepts in early childhood education. Experiences acquired at an early age contribute to adult skill with math.

II. Presentation:

CONCEPT	CLASSROOM ACTIVITIES
Measurement of time	Introductory Word Game: Have students secretly list all the words they feel the children should understand relating to time perception. Students must compose their individual lists. Have one person give a word and write it on the chalkboard. If anyone else has the word, it must be crossed off everyone's list. If no one else has it, that person circles the word as a score word. Then the next person takes their turn until no one has any more words. The winner is the one with the highest number of score words. Allow time for everyone to copy the list from the board.
Teaching premath concepts to preschoolers	Discuss teaching time sequences and increments of time to preschoolers. (Use the Teacher Information Sheet)

III. Application:

Have students complete Skill Builders on Student Assignment Sheet individually or as a group.

ASSIGNMENT SHEET

Math Concept: Measuring Time

Task: Teach the Concept of Time

Why learn this?

The passage of time can be measured. It is a concept that is difficult to relate to preschoolers because of its intangibility to them. Even adults have difficulty with time perception. Idle time goes slowly; while one is active, it seems to pass quickly. Unless students understand time concepts and levels appropriate to preschool learning, both children and students may be frustrated and confused. Disorientation in time may continue into adulthood. This information will build a strong foundation of time to help you as you work with children.

Principle Emphasized:

Units of time are given meaning by word descriptions and numbers.

Words to Know:

Chronological
Disorientation
Duration
Estimate
Equal
Genetic Sequence
Intangibility
Intervals
Lapses
Memories
Routines
Teachable Moment
Time Perception

Resources: Information Sheet - Measuring Time

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1. Read the resources.
2. Complete Skill Builder - Words to Know
3. Complete Skill Builder - Teaching Time Measurement
4. Complete Skill Builder - Telling Time

INFORMATION SHEET

MEASURING TIME

Children's Vocabulary in Time Measurement

When
Yet
Equal
Now
Then
Yesterday
Tomorrow
Today
Night
Tonight
Day
Week
Until

Month
Year
Slow, Slowly
Fast, Faster
Minutes
Hours
After
Before
Early, Earliest, Earlier
Late, Later, Latest
(How) Long (Till)

Soon
Morning
Afternoon
Noon
Evening
Start
Finish
Done
Over (With)
Future
Past
Ending
Begin, Beginning

Old, Older, Oldest
Young, Younger, Youngest
Birthday
Holiday
Seasons
Spring
Fall
Winter
Summer
Days of the week
Months of the year
Calendar

Time has varying meanings. "Now" will be "yesterday" when "tomorrow" comes. A child needs to know number concepts of 7 to understand that 7 days equal a week and that 30 or 31 days is a month. Preschoolers cannot relate to a year because their memories are too short to recall events that long ago. Until the child is 9 or 10 years old, he or she cannot comprehend long periods of time in the past. Use of cues in regular routines or repetitive events such as mealtimes and nursery school schedules, and daily television programming are helpful. Many problems arise with young children as a result of their inability to estimate the amount of time needed to complete certain tasks such as dressing or eating. Time lapse needs a frame of reference which they have not yet developed. Routines that are established help children with judgment of intervals of time which are called genetic sequence.

Although there are some differences in the order that children learn certain time concepts, they usually learn words relating to the present first. At three years, children most often understand "done," "finished," "over," "today," and "now." Four-year-olds relate time by when other activities usually happen. They know "morning," "noon," "afternoon," "night," and what day it is. At five they know the days of the week, and at seven years they know what time it is on the clock, the month, and season. Kindergartners are just beginning to absorb some time relationships. Most are beyond the child's reasoning ability. At eight years, they know what year it is and the day of the month. Historical time references and references to chronological order are beyond their level.

The child's idea of aging is different from that of adults. Children live in a personal time reference and see adults as changeless over time. For example, a child might say, "I'm going to marry you Mommy when I grow up," or "Just wait till I get big like Daddy." Daddy may be a man of small build, but he is much bigger than the child. A small child's viewpoint of time duration is always overestimated because short times seem long to the child.

Long intervals are underestimated because they are such abstract lapses. Something that happened weeks ago may be said by the child to have been yesterday or last week. When reprimands such as isolation or time on the "potty" are set by adults, they should take into account the child's perception of time -- how the child sees, hears and feels through the senses, and how he or she understands time. Five minutes to sit out of play is triple that in a child's perception.

Telling time by the clock is learned between six and seven years of age. Children progress in this ability by first understanding hour intervals, then advancing to half hours, then quarter hours, and finally smaller intervals. Children need to learn the differences in meaning between the long and short hand early. They take great pride in having play watches and often pretend to read them in dramatic play. When interest is shown such as this, rapid progress can be made with individual children if an adult makes the effort. This is an example of a "most teachable moment," when a child shows interest and is ready to learn.

SKILL BUILDER

WORDS TO KNOW

Directions:

Use the dictionary and Information Sheet to define the following words.

1. Chronological ______________________________

____

2. Disorientation ______________________________

____

3. Duration ______________________________

____

4. Estimate ______________________________

____

5. Equal ______________________________

____

6. Time Perception ______________________________

____

7. Genetic Sequence ______________________________

____

8. Intangibility ______________________________

____

9. Intervals ______________________________

____

10. Lapses ______________________________

____

11. Memories ______________________________

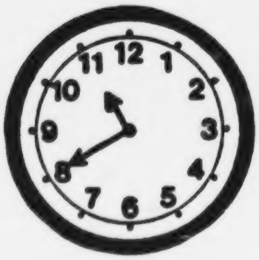
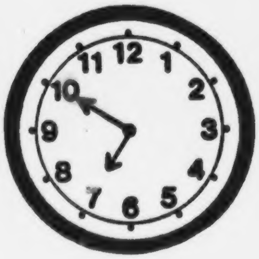
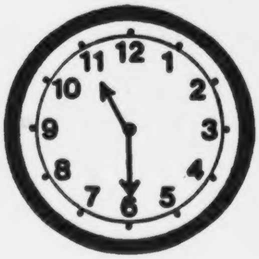
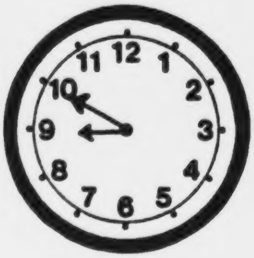
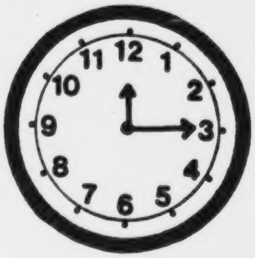
____

12. Routines ______________________________

____

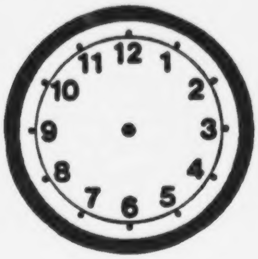
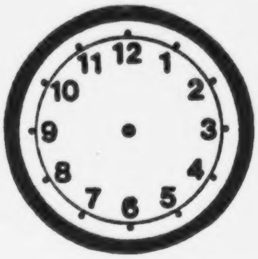
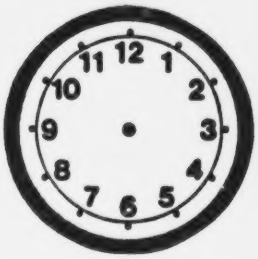
SKILL BUILDER

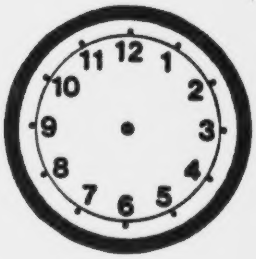
In the space below each clock, write the time shown on the face:

1.________ 2.________ 3.________ 4.________ 5.________

Draw the hands to show the time written below:



6. 6:20 7. 5:45 8. 2:00 9. 3:15 10. 9:10

****

Write the correct time for each event in the blanks.

11.________ Tardy time for morning arrival - preschool

12.________ Dismissal time at the end of the day - preschool

13.________ Time the children start to arrive - preschool

14.________ Range of reasonable bedtime for you

15.________ Related class time

16.________ Approximate time art should start in the preschool

17.________ How long do you have for class changes?

18.________ Your scheduled lunch period

19.________ Scheduled snack times in preschool

20.________ Scheduled hours for preschool

SKILL BUILDER

TEACHING TIME MEASUREMENT

Directions:

Develop and present an activity for teaching time measurement to preschool children in your center. Suggestions:

1. Use an egg timer to regulate activities in a game such as "Hot Potato."
2. Plant some seeds and chart the children's guesses as to how many days until the first sprout is seen.
3. Make a rotating-turn snack serving chart.
4. Make a markdown calendar for a special event.
5. Chart the children's birthdays on a calendar.

a bird's eye view

CHEMICAL REACTIONS OF ACIDS AND ALKALIES IN FOOD PREPARATION AND CLEANING COMPOUNDS

Understand this science concept:

The acidity and alkalinity of foods and cleaning solutions determine their properties and use.

Teacher Materials

Information Sheet
Sample Lesson Plan

Student Materials

Assignment Sheet:	Identify the Acidity and Alkalinity of Common Foods and Cleaning Compounds
Information Sheet	Controlling Chemical Reactions pH Laboratory Menu Successful Meringues
Skill Builders:	Words to Know Testing the pH of Common Foods and Cleaning Compounds Vegetable Cookery Foods for Thought pH Laboratory Menu pH of Cleaning Compounds

TEACHER INFORMATION SHEET

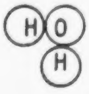
Understand this science concept:

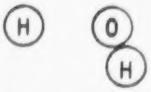
The acidity and alkalinity of foods and cleaning solutions determine their properties and use.

Acids and Bases

From time to time, with predictable frequency, a water molecule becomes separated into these two charged parts:

(H_2O) separates to become ($H+$ and $OH-$)





The OH- part is called a hydroxyl ion. The H+ part is called a hydrogen ion. Other substances are also separated when they are dissolved in water. They form a hydrogen ion and some kind of negatively charged ion. Carbonic acid is such a substance:

$$H_2CO_3 \rightleftarrows HCO^-_3 + H^+$$

Carbonic Acid — Bicarbonate — Hydrogen Ion

A substance whose molecules release hydrogen ions in solution is known as an acid.

Notice in the example given that the action is reversible; it can run either direction. This means that bicarbonate can combine with hydrogen ions to form carbonic acid. Any substance that combines with hydrogen ions in solution is a base or alkali.

In a glass of pure water, the amount of H+ and OH- ions are always equal to each other. For this reason pure water doesn't act like an acid or a base. It is in-between or neutral. Suppose you pour some hydrochloric acid (HCl) into the water. This substance separates into Cl- and H+ ions. With more H+ ions now in the glass, the OH- ions are more likely to bump into and combine with them, thereby forming water molecules. The outcome is that the hydroxyl ion concentration decreases by as much as the hydrogen ion concentration increases. The solution becomes more acidic.

Such changes in hydrogen ion concentration occur all the time. It's often useful to know how much change is taking place. However, it is cumbersome to work with numbers at the molecular level. For example, that glass of pure water has 150,000,000,000,000,000 hydrogen ions in it. This is why fluids are assigned a pH value. The pH scale is in whole numbers. pH is an abbreviated way of referring to the number of hydrogen ions in a substance. Pure water, which is neutral, has a pH of "7." This is midpoint in a scale ranging from "0" to "14." A substance with a pH less than 7 is acid. If the pH is greater than 7, the substance is base. All biochemical reactions are sensitive to shifts in pH.

Cecil Taggart and Ralph Starr, Biology, The Unity and Diversity of Life (Belmont, California: Wadsworth Publishing Company, 1981).

SAMPLE LESSON PLAN

Science Concept: pH of Foods and Cleaning Agents
Task: Identify the Acidity and Alkalinity of Common Foods and Cleaning Agents

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Objective: The student will be able to:

1. Classify some of the common foods and cleaning compounds as more or less acidic and alkaline.
2. Explain how to control the chemical reactions in food preparation for optimum product quality.
3. Explain the chemical reactions in cleaning compounds.

Teaching Aids:

- Glasses (2)
- Baking Soda
- Vinegar
- Litmus Paper
- Tea
- Milk
- Lemon Juice
- Cream of Tartar
- Egg Whites (2)
- Mixing Bowls (2)
- Electric Mixer
- Germicide
Deliming Agent
- Tomato Juice
- Fresh or Frozen Vegetables (4 Pkgs.)
- Saucepans with Lids (4)
- Dish Soap
- Soft Drink
- Ammonia
- Cocoa

I. Preparation of the Learner:

When you understand the pH scale, you will better understand how acid and alkali work together in leavening some baked products, in preparing meringues that do not break down, and in cooking attractive and palatable vegetables.

II. Presentation:

CONCEPT	CLASSROOM ACTIVITY
Acid and alkali react to form gas that leavens food products	Have students locate vinegar and baking soda on the pH scale with the following experiment - Place a small amount of vinegar in one glass and a small amount of baking soda in another. Pour the vinegar into the baking soda. Watch the immediate foaming reaction until the mixture calms to a neutralized solution. The above activity illustrates the chemical reaction that happens in all baked products that are leavened with baking soda or baking powder. Baking powders are a balanced combination of acid and alkali in dry form. When made moist by the liquid in a batter, the baking powder reacts to make carbon dioxide gas bubbles. The bubbles are made a permanent part of the food as

II. Presentation: (Cont'd)

CONCEPT	CLASSROOM ACTIVITY
	the batter around them cooks and is set. The same thing happens when baking soda (alkali) and an acid food (in this case vinegar) are combined.
An acid can he added to milk, which is alkaline, to make sour milk.	Certain foods can be made more acidic the addition of other ingredients. It is important to understand this reaction. It is useful in making substitutions for other products.
	Some recipes call for sour milk or buttermilk. These are the acid ingredients that react with alkaline ingredients to produce leavening. Milk that has not soured will produce no leavening action. If sour milk or buttermilk are not available, sweet milk can be made sour by adding one tablespoon of vinegar or lemon juice to enough milk to make one cup.
	Determine where milk and lemon juice are on the pH scale.
	Experiment: Test the milk and lemon juice with litmus paper; describe. Pour the lemon juice into the milk and stir. Test the soured milk with litmus; describe.
	Experiment: Add 1/4 tsp. baking soda to a small amount of sweet milk. Compare the reactions of the sweet and soured milk to baking soda.
Cream of tartar (acid) stabilizes whipped egg white foams	Cream of tartar (acid) is added to egg whites (alkaline) before whipping them into a foam. The added acid neutralizes any alkaline reactions and makes the air bubbles more stable and able to maintain their shape. The following experiment helps students compare the stability of egg whites whipped with and without the addition of acid.
	Experiment: Put two egg whites into separate bowls. Whip to a stiff foam with an electric mixer, one egg white that has had 1/8 tsp. cream of tartar added to it. Whip the second egg white to a stiff foam without adding cream of tartar.

II. Presentation: (Cont'd)

CONCEPT	CLASSROOM ACTIVITY
	Time the breakdown of the foams. Determine which separated the fastest. Test the egg whites with litmus paper to determine pH.

III. Application:

Using the assignment sheet, have students complete the Skill Builder activities individually or in groups.

IV. Evaluation

TEST - CHEMICAL REACTION OF ACIDS AND ALKALIS

Multiple choice:

1. ______ Cream of tartar is added to egg white foams to:
   a. keep the foam from turning yellow
   b. stabilize the foam
   c. obtain greater volume when whipping the eggs
   d. improve the flavor

2. ______ The reason tomato soup might curdle during preparation is:
   a. because the tomato juice and milk are both acid ingredients
   b. because the tomato juice is acid and the milk is alkaline
   c. because the milk is too hot when adding the tomato juice
   d. there is no pH change

3. ______ The pH of water is 7. This means:
   a. water is neutral because it is a balance of acid and alkali
   b. water is 7 times more acidic
   c. water is 7 times more alkaline
   d. water contains 7 minerals

4. ______ Most cleaning agents:
   a. are acidic in nature
   b. are alkaline in nature
   c. do not depend on a chemical reaction to be effective
   d. do not neutralize

ASSIGNMENT SHEET

Science Concept: pH of Foods and Cleaning Compounds

Task: Identify the Acidity and Alkalinity of Common Foods and Cleaning Compounds

Why learn this?

Chemical reactions occur in the preparation of food and in the use of cleaning agents. It is important to understand how to control them so that the user can achieve the best possible results.

By simple experiments, the activities of this section explain the properties of acidic and alkaline foods and cleaning compounds.

Principle Emphasized:

The acidity and alkalinity of foods and cleaning solutions determine their properties and use.

Words to Know:

Balance
Chemical
Compound
Deliming Agent
Ingredient
Leavening
Meringue
Neutral
pH Scale
Range
Reaction
Stabilize

Resources: Information Sheets - pH Scale
pH Laboratory Menu
Successful Meringues

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1. Read the resources
2. Complete Skill Builder - Words to Know
3. Complete Skill Builder - Testing the pH of Common Foods and Cleaning Compounds
4. Complete Skill Builder - Vegetable Cookery
5. Complete Skill Builder - Food for Thought
6. Complete Skill Builder - pH Laboratory Menu
7. Complete Skill Builder - pH of Cleaning Compounds

INFORMATION SHEET

CONTROLLING CHEMICAL REACTIONS

Ingredients and cleaning compounds are chemicals. It is important to understand how to control these chemicals so that they react the way they should in food preparation and in maintaining clean equipment and facilities. Each day you work with ingredients and cleaning compounds in the food service laboratory. Each time you cook or clean you are working with chemical compounds and controlling chemical reactions. Some of the chemical reactions that occur often in food preparation include:

1. Adding cream of tartar to egg whites to make meringue
2. Adding baking powder to batters to make them rise
3. Adding vinegar to milk to make sour milk

Chemical reactions that commonly occur in cleaning include:

1. Using detergents to wash dishes
2. Using oven cleaner to remove spilled foods and grease from the oven
3. Using a deliming agent to remove the white film from the inside of the dishwashing machine and steamers

The chemical reactions that take place in food preparation and cleaning are the result of using groups of compounds with acidic or alkaline properties. Each compound falls within a range of acid or alkali. Some acid compounds are more acidic than others. Some alkaline compounds are more alkaline than others. They vary in intensity and strength. Most foods are in the acid range; most cleaning compounds are in the alkaline range. When acids and alkalies are combined, a reaction takes place that changes both original compounds to something new, usually a salt and water. This is why alkaline soaps and detergents are used to wash away the acid foods left on unclean dishes and equipment. When you wash dishes, you are actually causing a chemical reaction between the alkaline cleaner and the acid foods that is called neutralization.

To show how acids and alkalies relate to each other, the pH scale is used. Notice that water is in the middle of the scale and has a pH of 7. Water is neutral because it is a balance of acid and alkali. All foods and cleaning compounds that are neutral or nearly neutral will be close to the number 7 on the pH scale.

pH SCALE

		pH Number		
Acid Range	Strong Acid	0		
		1	One million times more acidic than water	Muriatic acid - cement cleaner
				Deliming agent
		2		Citrus fruits
				Most fruits
		3		Soft drinks
				Cream of tartar
	Mild Acid	4	One thousand times more acidic than water	Tomatoes
				Buttermilk
		5		Bananas
				Coffee
		6		Milk
				Most vegetables
NEUTRAL--		7	Pure water pH 7 Equal in acid & alkali	Meats (fish-poultry-meats)
				Crackers
Alkaline Range	Mild Alkaline	8		Egg whites
				Baking soda
		9		
		10	One thousand times more alkaline than water	Cleaning compounds
	Strong Alkaline	11		Caustic potash-lye
				Drain cleaners
		12		
		13	One million times more alkaline than water	
		14		

INFORMATION SHEET

pH LABORATORY MENU

Crackers and Cheese
Tomato Soup
Hamburger Sandwich with Condiments
Swiss Steak
Baked Potato with Sour Cream
Green Beans
Biscuits
Tossed Salad
Fruit Salad
Meringue Shells with Fruit Filling
Red Devils Food Cake
Coffee
Tea
Soft Drinks

The menu above is rich in acid-alkaline reactions. It is a "chemical feast" in a good sense. Depending on how these foods are prepared, the cook can achieve different results.

TOMATO SOUP is acidic. It is made from the juice of tomatoes and tomatoes are acidic. Since it is an acid, it can react with milk, which has alkaline characteristics, and curdle. There are several possibilities for combining milk and tomato soup:

1. Pour the milk into the tomato base; do not stir
2. Pour the tomato base into the milk; do not stir
3. Combine the milk and tomato soup in either of the first two ways, stirring while adding

The stirring and slow addition of tomato soup and milk allows the pH to change slowly thereby preventing curdling. Adding the tomato soup to the milk should be more successful because it slowly changes the milk pH.

SWISS STEAK is usually a less tender cut of meat. The tough fibers are often weakened through the action of an acid tenderizer.

POTATOES in the raw state should be more acidic than cooked potatoes. Vitamin C, which provides acid characteristics, is usually lost in the cooking process.

TAP WATER varies in pH. Very hard water is often alkaline. Commercially softened water is often acidic. Chemical companies can provide hard water test kits for experiments with water. The acid-base characteristics of cooking water will affect products that are sensitive.

BISCUITS should be made with sour milk. Sweet milk can be used as a substitute if converted to sour milk by adding 1 Tbsp. lemon juice or vinegar to enough milk to make one cup.

TOSSED SALAD that includes lettuce is usually alkaline. The dressing is acidic. The salad dressing tends to neutralize the alkalinity in the greens. Salad oil also dissolves and absorbs some of the minerals from the lettuce.

FRUIT SALADS tested for pH should show various levels because of the characteristics of different fruits. The pH of citrus fruits is lower than for non-citrus. Bananas and apples are fairly low in acid. By mixing them with citrus fruits, the pH number is lowered and this prevents darkening of their cut surfaces.

MERINGUE is made from egg whites which are alkaline and cream of tartar which is acid. When these two ingredients are mixed, they neutralize each other, and the egg white becomes more stable in holding its shape and developing full volume. The sugar used in the recipe may add some acidity to the mixture.

RED DEVILS FOOD CAKE recipes are usually very alkaline. The higher the alkalinity of the batter, the redder the cake will be. The less alkaline the batter, the yellower the cake will be. Red devils food cakes have a slightly bitter or soapy taste due to their higher alkalinity.

COFFEE, TEA, AND SOFT DRINKS are as acidic as citrus fruit juices. Coffee stains are removed from the coffee urn with an alkaline urn cleaner. The combination of alkaline with acid neutralizes the stain and makes it easy to wash away.

CLEANING COMPOUNDS such as deliming agents are used to wash away the deposits on steamers and other pieces of heating equipment. The deposit that these compounds remove is a lime build-up. Lime is alkaline and the cleaners used to remove it are acidic in nature. Spilled pie filling is acidic, however, and needs to be neutralized by an oven cleaner with an alkaline pH.

INFORMATION SHEET

SUCCESSFUL MERINGUES

Meringue has many of the same characteristics as egg white foam. It is different, however, because sugar is suspended as a solution with the egg whites. Sugar is dissolved into the egg foam as the air cells are developed through whipping. It is important not to add the sugar until the foam starts to take form, has developed some air cells, and is strong enough to support the weight of the sugar. Sugar is added slowly, sprinkled across the top of the foam so as not to break down any of the cells. The mixture is whipped for a time to dissolve the sugar before more is added. As the foam increases in volume and becomes stable and creamy, it gains the strength to support large amounts of sugar. Cream of tartar is added to the egg whites early during the foamy stage so that the air cells developed in whipping are stronger and more elastic.

A correctly made meringue is whipped to soft peaks. At the soft peak stage, the peaks curl over and have a high gloss. Meringue is an unstable foam and will return to bubbles and then to liquid again unless baked in some way. The meringue can be folded into other batters and baked or used as a baked topping on cream pies. Baking makes the air cells in the foam permanent.

SKILL BUILDER

WORDS TO KNOW

Directions:

Look up and study the definitions of the following words. Use the information to select the word(s) that best completes each sentence. Write the word in the blank provided.

Balance
Chemicals
Compounds
Deliming Agent
Ingredients
Leavened
Meringue
Neutralize
pH Scale
Range
Reactions
Stabilize

1. Every day you work with ______________ in recipes and use cleaning ______________ to clean equipment.

2. In doing your job, you are actually controlling ________________.

3. When a white film builds up in the steamers, you use a ______________ ______________ to remove it.

4. Each time you clean dishes, you use alkaline detergents to ______________ acidic soils.

5. The alkalies and acids that combine during dishwashing ______________ each other.

6. A ________________ is used for deciding where particular foods and cleaning compounds are placed on an acid-alkali range.

7. When baked products are ______________ or a ______________ is whipped to cover the top of a pie, acid-alkaline reactions are taking place.

8. Most cleaning compounds are in the alkaline __________________.

SKILL BUILDER

TESTING THE pH OF COMMON FOODS AND CLEANING COMPOUNDS

Directions:

To determine the pH (acidity or alkalinity) of the following 12 products, use litmus paper. Test each sample with a blue litmus paper strip. Paper samples that turn pink indicate the presence of acid. If the blue paper does not react, a test must be made with pink litmus paper. If the pink strip turns blue, the sample is alkaline. If the sample shows no change with pink or blue litmus paper, the product is neutral, and is neither acid nor alkaline.

Place a small amount of each of the 12 products to be tested into small glass dishes. Be sure that each sample is well-labeled and that the samples do not contaminate each other by use of common spoons. If a solid is to be tested, it must be made into a liquid for the indicator to work. To do this, break up the solid and mix it with water. Products that do not go into solution will not give accurate results.

Test the litmus paper with vinegar (acid) and baking soda (alkali) to see the change in color as chemical reaction takes place. This will provide a measure for judging the change caused by the 12 ingredients and cleaning compounds to be tested on the job sheet.

NOTE: If the entire litmus strip is soaked in the sample, it is hard to determine the original color of the dry paper. To avoid the problem, code all the dry litmus strips before using them by putting "P" on the pink strips and "B" on the blue strips.

FOOD/COMPOUND	CHECK THE CORRECT COLUMN		
	ACID	ALKALI	NEUTRAL
1. Lemon juice			
2. Milk			
3. Baking soda			
4. Water			
5. Dish soap			
6. Soft drink			
7. Ammonia			
8. Tomato juice			
9. Deliming agent			
10. Germicide			
11. Cocoa			
12. Tea			

SKILL BUILDER

VEGETABLE COOKERY

The purpose of this activity is to show how to control the color of cooked vegetables through the use of acid and alkali ingredients. Acids and alkalies affect the color of cooked vegetables. Some are brighter and more attractive when cooked with a small amount of acid in the cooking water. Others are dulled by acid ingredients.

Directions:

Select and test one vegetable from each of the four color groups. Use fresh or frozen products. Cook the vegetables in four saucepans for 5 minutes. Use 1/2 cup water in each saucepan. Drain the cooked vegetables. Save the products and liquid. Cooking liquid can also be tested with litmus paper to determine pH.

Vegetable Product	1/2 c. water & 1 tsp. baking soda		1/2 c. water & 1 tsp. vinegar		Conclusions
	Product Color	Liquid Color	Product Color	Liquid Color	
Green Vegetable (peas, green beans)					
Red Vegetable (cabbage, beets)					
White Vegetable (cauliflower, wax beans)					
Orange-Yellow Vegetable (carrots, sweet potatoes)					

SKILL BUILDER

FOOD FOR THOUGHT

Directions:

To reinforce your understanding about pH and how it effects results in preparing food try, the following ideas.

1. Cook carrots in ginger ale and compare with carrots cooked in water. Record the results and explain the difference in the two products.

2. Place about 1 cup green beans, fresh or frozen, in each of two saucepans. Add 1 cup water to the first pan. Add 1 cup water and 1 Tbs lemon juice to the second. Boil the green beans until just tender. Explain the results in terms of pH.

3. Acidic foods are not good hosts to contaminants that cause food poisoning. Set up an experiment to illustrate this principle. Record the results.

SKILL BUILDER

pH LABORATORY MENU

The following menu items all contain ingredients that can be tested for pH. Some of the products themselves are the result of chemical reactions. Adapt the menu to fit your own food service establishment. As you prepare the foods, pay attention to the chemical reactions that are built into the recipes. Test the pH of each food and record on the pH Chart.

APPETIZER:	*Crackers and Cheese*
SOUP:	*Tomato Soup*
SANDWICH:	*Hamburger Sandwich with Condiments*
ENTREE:	*Swiss Steak* *Baked Potato with Sour Cream* *Green Beans* *Biscuits (use recipe with sour milk)*
SALAD:	*Tossed Salad with Dressing* *Fruit Salad (include citrus and non-citrus)*
DESSERT:	*Meringue Shells with Pie Filling* *Red Devils Food Cake*
BEVERAGE:	*Coffee* *Tea* *Soft Drinks*

pH TEST CHARTS

Directions:

Use litmus paper to test the pH of the following foods. Put a check mark in the column that best describes the pH of the product.

TOMATO SOUP

	ACID	ALKALINE	NEUTRAL
Crackers			
Cheese			
Tomato Juice			
Milk			
Tomato Soup			

1. Why is it important that the tomato soup be added slowly to the milk mixture while constantly mixing?

2. Explain what pH has to do with the way milk and tomato soup are combined.

HAMBURGERS

	ACID	ALKALINE	NEUTRAL
Catsup			
Mustard			
Relish			
Pickle Chips			

SWISS STEAK

	ACID	ALKALINE	NEUTRAL
Steak			
Tomatoes			

GREEN BEANS

	ACID	ALKALINE	NEUTRAL
Raw Green Beans			
Green Beans and Salt			
Green Beans and Cream of Tartar			
Tap Water			

BISCUITS

(Make sour milk by adding 1 Tbsp. vinegar or lemon juice to enough sweet milk to make 1 cup)

	ACID	ALKALINE	NEUTRAL
Sweet Milk			
Vinegar			
Soured Milk			
Baking Soda			

GREEN SALAD

	ACID	ALKALINE	NEUTRAL
Lettuce (Crush a few leaves in water)			
Italian Dressing			

1. Put dressing on a salad and let the salad set in the refrigerator for two hours. Record your observations.

2. Relate your observations to what you know about the pH of salad and dressing.

FRUIT SALAD

	ACID	ALKALINE	NEUTRAL
Non-Citrus Fruits 1.			
2.			
Citrus Fruits 1.			
2.			

MERINGUE SHELLS

	ACID	ALKALINE	NEUTRAL
Egg Whites			
Cream of Tartar			
Egg Whites with Cream of Tartar, Before Whipping			
Meringue, Fully Whipped			
Pie Filling			

1. What physical and chemical changes did the sugar appear to cause?

RED DEVILS FOOD CAKE

	ACID	ALKALINE	NEUTRAL
Cocoa or Chocolate			
Baking Soda and Water			
Milk -- Sweet or Sour			
Prepared Batter before Baking			

1. Describe why the chocolate cake is red.

BEVERAGES

	ACID	ALKALINE	NEUTRAL
Coffee			
Hot Tea			
Tea with Lemon Juice			
Soft Drink			
Urn Cleaner			

SKILL BUILDER

pH OF CLEANING COMPOUNDS

Directions:

Use litmus paper to test the pH of all the cleaning compounds used in the laboratory. Take precautions not to mix chemicals or cross-contaminate them. Use goggles and gloves.

COMPOUND	BRAND NAME	ACID	ALKALINE	NEUTRAL
Deliming Agent				
Oven Cleaner				
Dishwashing Machine Detergent				
Disinfectant				
Chlorine Bleach				
Others:				

1. Based on your experiment, is the lime build-up inside the dishwashing machine and steamers alkaline or acidic? ______________________

2. Identify a food spilled in the oven ______________. Test it with an oven cleaner. Based on your experiment, was the food acidic or alkaline? __________________

a bird's eye view

CONTROLLING BACTERIAL CONTAMINATION

Understand these science concepts:

Bacteria are destroyed or inhibited in growth by the use of sunlight, ultraviolet light, heat, steam pressure, freezing, drying, or chemical antiseptics and germicides.

Teacher Materials
Information Sheet
Sample Lesson Plan

Student Materials
Assignment Sheet: Control Bacterial Contamination
Information Sheet: Controlling Bacterial Contamination
Skill Builders: Words to Know
Germ Multiplication
Let's Have a Picnic
Bacterial Contamination in Protein and Non-Protein Foods
How are Bacteria Transferred?
Chemicals for Controlling Bacterial Growth

TEACHER INFORMATION SHEET

CONTROLLING BACTERIAL CONTAMINATION

Understand these science concepts:

Bacteria are destroyed or inhibited in growth by the use of sunlight, ultraviolet light, heat, steam pressure, freezing, drying, or chemical antiseptics and germicides.

Bacteria are small one-celled microorganisms that cause decay and disease. They are usually divided into groups according to their shape.

Round - cocci (singular, coccus) - Grow in pairs, clusters, or chains. Examples are staphytococci, pneumococus, and streptococcus.

Rods - bacilli (singular, bacillus) - Shaped like rods and sometimes grow in long chains. An example is typhoid bacillus.

Spiral or Rod-Shaped - spirilla. An example is spirochetes.

Bacterial Growth

Bacteria multiply by splitting in two, growing, and splitting again. They reproduce rapidly under favorable conditions - about once every twenty to thirty minutes. Favorable conditions for bacterial growth are heat, moisture, and food.

Certain kinds of bacteria need oxygen:

Aerobe Bacteria - Needs oxygen
Anaerobe Bacteria - Does not need oxygen

Anaerobes can grow rapidly in deep wounds, such as nail wounds, which are not exposed to the air. Tetanus and lockjaw are caused by anaerobes.

Disease Caused by Bacteria

Bacteria which cause disease live and grow in soft tissue, blood, and bones. They obtain nourishment by digesting blood, muscle, and other tissue. During growth they may give off poisonous waste products. They may damage tissue or deposit the poisonous waste products into the blood stream causing disease. Some diseases caused by bacteria are:

Scarlet Fever
Whooping Cough
Tetanus
Diptheria
Pneumonia
Gonorrhea
Tuberculosis
Typhoid Fever
Syphilis
Meningitis

Bacteria and Foods

Bacteria causes many foods to spoil. Milk turning sour is an example of fermentation caused by bacteria. When staphylococci bacteria grows in foods, it causes a serious food poisoning. Improperly canned foods can cause botulism poisoning because of growth of an anaerobic bacteria. If a can of food has a bulging top, it is an indication of food spoilage caused by a type of bacteria that produces gases. Salmonellosis is a common form of food poisoning found in meats. Poisoned foods should never be eaten because they cause illness and, in some cases, death.

Methods for Killing Bacteria

1. Sunlight and ultraviolet light kills some types.
2. Heat and steam pressure are excellent ways of killing bacteria.
3. Freezing and drying prevent bacteria from multiplying; they do not kill the bacteria.
4. Chemicals can also kill or prevent bacteria from growing.

Antiseptic

An antiseptic is a chemical substance that either kills or slows down bacterial growth that causes disease and decay.

Many terms are used to describe substances that slow down or stop bacterial growth. The following are the definitions assigned by the American Medical Association Council on Drugs:

> Germicide - A substance or agent that destroys microorganisms so they will not grow when placed in appropriate culture mediums.
>
> Antiseptic - A substance that hinders or prevents the growth of the microorganisms but does not necessarily destroy their vitality.

Many chemicals will kill germs or stop their growth under proper conditions. Bacteria differ in the ways antiseptics and germicides affect them. A germicide that destroys one type of germ may have no effect on another.

World Book Encyclopedia, Vol. 2. (Chicago: Field Enterprises Educational Corporation, 1966)

SAMPLE LESSON PLAN

Science Concept: Aseptic Techniques
Task: Control Bacterial Contamination

Objective: The student will be able to:

1. Name various types of bacteria and the conditions favorable to growth
2. List procedures to prevent bacterial contamination in a health care facility

Teaching Aids:

Microscope
Slides of various types of bacteria
Chemicals for Controlling Bacterial Growth Chart for each student
Hidden Word Puzzle, How Are Bacteria Transferred?, for each student

I. Preparation of the Learner:

Hand out hidden word puzzles and allow time to complete. Discuss answers.

II. Presentation:

CONCEPT	CLASSROOM ACTIVITIES
Types of bacteria	Obtain slide samples and a microscope from the Biology Department and have students identify bacteria by shape.
Disease caused by bacteria	Discuss how bacteria cause disease.
Food spoilage caused by bacteria	Discuss how bacteria cause food to spoil.
Methods of controlling bacterial growth	Discuss methods of controlling bacterial growth. Read the labels on all the antiseptics and germicides used in a health care facility and complete the chart, Chemicals for Controlling Bacterial Growth.

III. Application:

Have students individually complete Skill Builders on the Student Assignment Sheet.

OR

Have students complete Skill Builders as a class activity.

ASSIGNMENT SHEET

Science Concept: Aseptic Techniques

Task: Control Bacterial Contamination

Why learn this?

Bacteria are tiny living organisms which can be seen only with the help of a microscope. They multiply under certain conditions of food, moisture, and warmth. As they multiply, some bacteria are able to form toxins and can contaminate or pollute the material in which they grow. Some of the toxins are so powerful that they can cause serious illness or even death. As a health aide it is important to understand how to prevent these conditions for the health of the patient as well as for your own health.

Principle Emphasized:

Understand these science concepts:

Bacteria are destroyed or inhibited in growth by the use of sunlight, ultraviolet light, heat, steam pressure, freezing, drying, or chemical antiseptics and germicides.

Words to Know:

- Aseptic
- Bacteria
- Communicable
- Contamination
- Germs
- Pasteurization
- Pathogens
- Polluted
- Sanitation
- Staphylococcus

Resources: Information Sheet - Controlling Bacterial Contamination

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1. Read the resources
2. Complete Skill Builder - Words to Know
3. Complete Skill Builder - Know Germ Multiplication
4. Complete Skill Builder - Let's Have a Picnic
5. Complete Skill Builder - Bacterial Contamination in Protein and Non-Protein Foods

INFORMATION SHEET

CONTROLLING BACTERIAL CONTAMINATION

Bacteria are called microorganisms because they are so small and because they are living organisms. Some bacteria are helpful to people but others can cause disease. Bacteria are sometimes referred to as germs.

When working in a health care facility, you soon learn the importance of cleanliness. The main goal of all health aides is ideal sanitation conditions.

About one hundred years ago, a French scientist named Louis Pasteur discovered that bacteria:

1. Causes many diseases
2. Can be killed by heat (high temperatures)

The word "pasteurization," the process of heating milk to 140°F and keeping it at that temperature for 30 minutes, came from Louis Pasteur's name.

A few years later a British surgeon, Joseph Lister, found that bacteria could be killed by carbolic acid. He realized that many deaths in hospitals were due to unclean conditions, and he was the first to demand clean tools and pure air during surgery.

Disease producing germs are everywhere: in the air, on furniture, on draperies, on the floor, and on all the equipment. Germs multiply very rapidly and can cause infection to spread from one person to another very quickly.

Disease producing bacteria are called pathogens. They grow best at body temperature (98.6°F). Pathogens destroy human tissue and give off waste products called toxins which are poisonous to the body.

Staph or staphylococcus is a bacterial infection caused by the bacteria staphylococci. These bacteria are very dangerous and hard to kill even with antibiotics; therefore, aseptic techniques are very necessary to prevent staph infections.

Bacteria grow well with the following conditions:

1. Oxygen O_2
2. Darkness
3. Temperatures of 50°F to 110°F
4. Moisture

Remember bacteria are everywhere; they move from one person or thing to another very rapidly. With proper conditions bacteria multiply very rapidly. Under favorable conditions one bacteria can multiply every 20 minutes and become 16 million in a 24 hour period. By using aseptic techniques, bacteria contamination and communicable diseases can be brought to a minimum in the health care facility.

"On a Picnic We Will Go," Current Health (May, 1980), p. 11

Grace V. Hornsmann, Basic Nursing Procedures (Albany, NY:Delmar Publishers, 1980), Section VIII.

See Chapter 2 in Hospital Research and Educational Trust, Being a Housekeeping Aide (Bowie, Maryland: Robert J. Brady Company, 1975)

See Chapter 3 in Hospital Research and Educational Trust, Being a Housekeeping Aide (Bowie, Maryland: Robert J. Brady Company, 1975)

SKILL BUILDER

WORDS TO KNOW

Directions:

Using the information sheet and a dictionary, define the following words by using them in a sentence.

1. Aseptic
2. Bacteria
3. Communicable
4. Contamination
5. Germs
6. Pasteurization
7. Pathogens
8. Polluted
9. Sanitation
10. Staphylococcus

SKILL BUILDER

GERM MULTIPLICATION

Directions:

Answer the following questions.

1. Germs (bacteria) multiply when they have:

   a)
   b)
   c)
   d)

2. When germs multiply, they ____________________ in half.

3. Under ideal conditions germs divide every ________________ minutes.

4. One germ divides and becomes ____________
   two germs divide and become ____________
   four germs divide and become ____________

5. Starting with one germ at 12:00, how many germs would you have at 2:00?

TIME		GERMS	TIME		GERMS
12:00		1	1:40		___
12:20		___	2:00		___
12:40		___	2:20		___
1:00		___	2:40		___
1:20		___			

SKILL BUILDER

LET'S HAVE A PICNIC

Directions:

Plan a picnic with the typical picnic foods. For example:

- Fried Chicken
- Hamburger
- Watermelon
- Potato Salad
- Macaroni Salad
- Cole Slaw
- Deviled Eggs

Prepare the picnic foods in the laboratory. Set aside a sample of each of the foods prepared and let it stand on the counter. Refrigerate the rest of the food. The next day examine and compare the products left out on the counter to the foods refrigerated. After examining and evaluating the bacterial contamination of the picnic foods that were improperly stored on the counter, record the results. Enjoy the properly stored foods picnic style in the classroom. If available, a microscope could be used to examine foods further.

BACTERIAL CONTAMINATION
PROPER AND IMPROPER STORAGE OF FOODS

Directions: Place the code letter that best describes the food being evaluated with and without proper storage.

Code:
E = Excellent
G = Good
F = Fair
P = Poor

Food ______________________________

GENERAL APPEARANCE	PROPER STORAGE	WITHOUT PROPER STORAGE
ODOR		
TEXTURE		
COLOR		

** NOTE ** Either add on to this chart or make individual cards for each food item.

SKILL BUILDER

BACTERIAL CONTAMINATION IN PROTEIN AND NON-PROTEIN FOODS

Directions:

Complete the following experiment to observe the different rate at which protein and non-protein foods deteriorate due to bacterial contamination. Use the following foods:

Protein Foods: 1/2 lb. Raw Hamburger
1/2 c. Cottage Cheese

Non-Protein Foods: 1 Slice Bread
1 Whole Apple

Place the four foods being used in the experiment on four different dishes. After 24 hours examine the foods for the degree of deterioration. Note: do foods high in protein (hamburger and cottage cheese) deteriorate due to bacterial action faster than the apple and the slice of bread which have little or no protein? Use evaluation device below to record observations. Check foods again after 48 and then 72 hours.

EVALUATION
BACTERIAL CONTAMINATION
PROTEIN AND NON-PROTEIN FOODS

Directions: Upon observing the bacterial deterioration of the food listed, describe its general appearance.

Food ______________________ (Circle one) Protein Non-Protein

After 24 hours

Color ______________________
Texture ______________________
Odor ______________________
____

After 48 hours

Color ______________________
Texture ______________________
Odor ______________________
____

After 72 hours

Color ______________________
Texture ______________________
Odor ______________________
____

** NOTE** Either add on to this chart or make individual cards for each food item.

SKILL BUILDER

HOW ARE BACTERIA TRANSFERRED ?

HIDDEN WORD PUZZLE

Directions:

Bacteria can be transferred from one person to another in many ways. One is through the air from sneezing. The words listed below are hidden in the puzzle. When you find a word, draw a circle around it. The words go in all directions.

Lungs
Mouth
Nose
Trachea
Air Sacs
Mucus

Hair
Cough
Sneeze
Germs
Bacteria

S	E	Z	E	E	N	S	H	S	E
R	I	S	C	A	S	R	I	A	E
H	L	E	S	L	I	E	I	A	Z
G	D	O	N	A	C	R	T	E	C
U	A	S	C	G	E	R	M	S	H
O	M	O	U	T	H	Z	T	O	Y
C	M	U	C	U	S	T	S	N	L
G	H	A	I	R	M	I	L	Z	L
Z	B	T	R	A	C	H	E	A	I
L	U	N	G	S	G	A	R	Y	M

Rosen, Seymour, Biology Workshop (New York, NY: Globe Book Company, 1978)

SKILL BUILDER

CHEMICALS FOR CONTROLLING BACTERIAL GROWTH

ANTISEPTICS			GERMICIDES		
NAME	CHEMICAL	USE	NAME	CHEMICAL	USE

a bird's eye view

CONTROLLING
VIRAL CONTAMINATION

Understand this science concept:

Contagious diseases caused by microorganisms such as viruses can be controlled through aseptic techniques and immunization.

Teacher Materials

Information Sheet
Sample Lesson Plan

Student Materials

Assignment Sheet:	Control Viral Contamination
Information Sheet:	Viral Contamination
Skill Builders:	Words to Know
	What's the Answer
	Immunization
	Handwashing
	Daily Care of Bedside Unit

TEACHER INFORMATION SHEET

Understand this science concept:

Contagious diseases caused by microorganisms such as viruses can be controlled through aseptic techniques and immunization.

Viruses are microorganisms or tiny germs. They are smaller than bacteria. The largest viruses can be seen under a regular microscope, but most can be seen only with an electron microscope.

Viruses are made up of a central core of nucleic acid surrounded by a protein coat. They are incomplete organisms that must live like parasites on large living cells.

A virus particle attaches itself to a cell. The core of the virus penetrates and directs the life processes of the cell so that many more virus particles are formed. These new particles are then set free to attack other cells.

It is believed that many diseases are caused by viruses. These include:

Poliomyelitis
Measles
Chicken pox
Mumps
Influenza
Hepatitis (Disease of the Liver)
Herpes Simplex (Cold Sores)
Herpes Zoster (Shingles)

It is also known that viruses cause many diseases of the respiratory tract. Viruses are believed to cause some tumorous growths and are being investigated as a possible cause for cancer.

Treatment

Viruses are not susceptible to the antibiotics or similar drugs that can be used against bacteria. It is difficult to destroy the virus without hurting the cells.

Prevention

An attack of a viral disease often makes a person immune for life. Doctors try to make people immune before they catch the disease by using vaccines.

Vaccines are living viruses weakened by chemicals.

Some viral infections have no known vaccine. An example of this would be the virus pneumonia. It is an infection of the lungs caused by very small virus microorganisms. This type of pneumonia is very contagious. Doctors believe it is spread by breathing air containing these germs. An infected person may cough or sneeze and spray tiny droplets containing the virus into the air. Another person breathes these germs and may contract the disease. It is believed the common cold is caused by a virus and is spread from person to person in a similar manner.

Methods of Controlling Viral Contamination

It has already been mentioned that some viral infections can be controlled by vaccinations. Isolation of a patient would be another method of controlling the spread of infection. The use of germicides and antiseptics to wash objects, linens, and facilities may help prevent contamination.

World Book Encyclopedia, Volume 19. (Chicago: Field Enterprises Educational Corporation, 1966).

SAMPLE LESSON PLAN

Science Concept: Aseptic Techniques
Task: Control Viral Contamination

Objective: The student will be able to:

1. Define viral infections
2. Name diseases caused by viral infections
3. List methods of preventing the spread of viral infections

Teaching Aids:

Resource Speaker

I. Preparation of the Learner:

To prevent disease causing viral microorganisms from spreading, it is important that the health aide understand how to control viral contamination.

II. Presentation:

CONCEPT	CLASSROOM ACTIVITIES
Viral infections	Resource Speaker: Have your school nurse or local pediatrician come in and speak on viral infections, communicable diseases, and immunizations.
Preventing viral contamination	Discuss methods of controlling viral contamination.

III. Application:

Have students individually complete the Skill Builders on Student Assignment Sheet.

ASSIGNMENT SHEET

Science Concept: Aseptic Techniques

Task: Control Viral Contamination

Why learn this?

Viruses are infections that cause disease. As a health aide it is important you know how to prevent the spread of virus infectious disease by using aseptic techniques.

Principle Emphasized:

Contagious diseases caused by microorganisms such as viruses can be controlled through aseptic techniques and immunization.

Words to Know:

- Agents
- Cell
- Crystallize
- Electron
- Germs
- Immunity
- Microorganisms
- Microscope
- Transfer
- Viruses

Resources: Information Sheet - Viral Contamination

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1. Read the resources
2. Complete Skill Builder - Words to Know
3. Complete Skill Builder - What's the Answer?
4. Complete Skill Builder - Immunization
5. Complete Skill Builder - Handwashing
6. Complete Skill Builder - Daily Care of Bedside Unit

INFORMATION SHEET

VIRAL CONTAMINATION

Viruses are microorganisms much smaller than bacteria which can only survive in living cells, not on objects. Viruses are infective agents that cause disease.

The word virus comes from earlier words meaning poison. Viruses have characteristics of living cells although they also exist on nonliving material. Most viruses can only be seen with an electron microscope. When a virsus is outside a living cell it does not carry out any life activities, but once inside a cell it repoduces very rapidly. Some viruses may be crystallized and stored indefinitely in a laboratory jar without losing their ability to reproduce. But once they are noncrystallized and released into a living organism they grow very quickly. Some viral disease such as smallpox and polio can be prevented by immunization. This gives the patient an immunity to the disease.

The need for immunization of very young children against communicable diseases is great because the death rate is high. Children should be protected against smallpox, diphtheria, poliomyelitis (polio), pertussis (whooping cough), measles, tetanus, and typhoid. In addition, booster doses of some immunizing agents are given at specified times.

IMMUNIZATION CHART

DISEASE	MONTHS				YEARS							
	2	3	4	12	2	4	6	8	10	12	14	16
Whooping Cough	X	X	X	X		X						
Smallpox				X			X					
Measles				X								
Polio	X		X	X	X	X	X					
Diphtheria	X	X	X	X		X		X		X		X
Tetanus	X	X	X	X		X		X		X		X
Typhoid				X		X						

SKILL BUILDER

WORDS TO KNOW

Directions:

Using the information sheet and a dictionary, define the following words by using them in a sentence.

1. Agents
2. Cell
3. Crystallize
4. Electron
5. Germs
6. Immunity
7. Microorganisms
8. Microscope
9. Transfer
10. Viruses

SKILL BUILDER

WHAT'S THE ANSWER ?

Directions:

Using the information sheet and a dictionary, answer the following questions.

1. How are we able to see viruses?

2. Find the meaning of the word "virus" in the dictionary. Find, also, the meanings of other words that begin with "viru." All such words are connected in meaning. From your dictionary study, would you think all viruses are harmful? Why?

3. Can you develop immunity to diseases caused by viruses?

4. What are some diseases you can become immune to? Name at least two.

5. How is an electron microscope different from an ordinary microscope?

6. How long can viruses be crystallized in the laboratory?

SKILL BUILDER

IMMUNIZATION

Directions:

Using the table below, make a record of the diseases which you have been immunized against. Obtain the information from your parents, doctors, or school nurse. The Immunization Chart found on the information sheet will be helpful.

DISEASE	DATE IMMUNIZED	HOW LONG IMMUNIZATION LASTS
Smallpox		
Polio		
Tetanus		
Diphtheria		
Typhoid		
Measles		
Whooping Cough		

SKILL BUILDER

HAND WASHING

Directions:

Handwashing is one method of preventing the spread of disease - transferring organisms from one person or place to another. When handwashing is done conscientiously at the right time and using the correct method, it is the best known means of controlling the spread of disease. Practice the following steps.

Supplies:
Running Water
Soap or Detergent
Paper Towels
Cuticle Stick or File

Safety Precautions:

- Always wash hands between care of patients
- Always wash hands whenever there is a question as to whether they are clean
- Keep hands lower than elbows
- Avoid touching sink with hands or uniform

STEPS	KEY POINTS
1. Identify need	1. Go to sink area
2. Check available supplies	2. Note if enough soap and paper towels
3. Turn on water to a gentle stream	3. Preferably at a sink with foot or knee controls. If hand-controlled faucets are used, leave water running throughout procedure
4. Adjust the temperature of water	4. To comfort
5. Wet hands and wrists under running water	
6. Apply detergent or soap from dispenser to hands	6. If bar soap or detergent is used, the bar should be held in your hands throughout the entire time of soaping. Cover entire surface of hands and wrists

STEPS	KEY POINTS
7. Rinse bar of soap under running water	7. Return bar of soap to container
8. Form lather	8. Add water gradually as hands are rubbed vigorously
9. Work lather over hands and wrists	9. Rub one lathered hand against the other
10. Work suds between fingers and high up on wrists	10. Rub the lather over every part of the hands and fingers
11. Rub finger tips in palm of other hand to push sudsy solution under nails	11. Repeat for other hand
12. Clean nails with cuticle stick or file	12. According to policy of supervisor or facility. Rinse stick after cleansing under each nail
13. Apply more detergent or soap	13. When adding more detergent or soap for more lather, rinse hands before applying
14. Continue washing for the required time	14. May be from 30 seconds to 3 minutes, depending on type of cleansing agent, the policy of the employing facility, and amount of contamination present
15. Rinse hands and wrists under running water	15. Keep hands slanted downward over sink when rinsing
16. Using separate paper towel for each hand, dry hands with circular motion	16. Dry from fingertips to wrist
17. Turn water off	17. If hand-controlled faucet is used, use a clean paper towel to cover the hand control and turn off the faucet

Directions for Summary:

Read the statements below. If you feel the statement is true, place a "T" in the blank beside it. If you feel the statement is false, place an "F" in the blank and correct the statement in the space provided.

_____1. It is best to keep your hands even with the elbows when washing.

_____2. Preparation for handwashing would include checking available supplies.

_____3. Fingertips are best cleaned by friction generated from rubbing them on a bar of soap.

_____4. Areas between fingers should be cleaned before cuticles are cleaned.

_____5. All handwashing procedures should be done for a minimum of 4 minutes.

_____6. Soap/detergent application should be done one time.

_____7. The water tap should be turned off by using only fingertips.

_____8. Correct hand position for rinsing should be with fingers elevated.

_____9. Hands should be dried from wrist to finger area.

_____10. It is best to perform handwashing before and after care of a patient.

Adapted from: Procedures for the Practical Nurse - Nursing, Division of Vocational Education, Trade and Industrial Education Service, State of Ohio, 1979

SKILL BUILDER

DAILY CARE OF BEDSIDE UNIT

Directions:

The patient's unit includes the bed, bedside stand, overbed table, chair, and equipment necessary for individual patient care. A clean, orderly unit promotes patient safety and cleanliness. An orderly unit also lends itself to organization and ease of patient care. A well stocked, clean unit is beneficial to both patient and caregiver. Practice cleaning and organizing a patient unit following the steps and key points below.

Equipment: Damp Dusting Cloth or Paper Towel
Bedside Paper Bag
Stock for Depleted Equipment

STEPS	KEY POINTS
1. Take cleaning equipment to unit	1. According to policy of employer or employing facility
2. Remove waste	2. Place in large trash receptacle
3. Replace individual bedside tissue bag with clean bag	3. Place within patient's reach
4. Damp dust all surfaces of bed, overbed table, bedside stand, cabinet, and window sill	4. Begin work with area farthest from patient
5. Wash hands	5. Follow handwashing procedure
6. Obtain fresh drinking water	6. Place within easy reach of patient
7. Turn bedside stand so patient can easily open drawers	
8. Adjust lighting	
9. Adjust draperies	9. As desired by patient
10. Care for flowers	10. As indicated per accompanying instructions
11. Check signal cord and/or bed adjuster	11. Place conveniently for patient's use

STEPS	KEY POINTS
12. Make note of depleted stock	12. To be brought back to bedside upon return
13. Place patient in comfortable position	13. Bed height in low position; bedrails raised if indicated
14. Leave unit in order	
15. Wash hands	15. Follow handwashing procedure

Directions for Summary: Complete the following questions.

1. What is/are the purpose(s) of daily care of bedside unit?

2. How should you organize the damp dusting part of the room care?

3. Where would you place the patient's bedside tissue bag? Why?

4. Where in this procedure is handwashing indicated? Why?

5. What action should you perform if supplies are depleted?

6. What is/are the safety precaution(s) with care of the patient room?

Adapted from: Procedures for the Practical Nurse - Nursing, Division of Vocational Education, Trade and Industrial Education Service, State of Ohio, 1979

a bird's eye view

LEAVENING WITH
BAKING SODA AND BAKING POWDER

Understand this science concept:

Sodium bicarbonate (baking soda) liberates carbon dioxide in the presence of an acid

Teacher Materials
Information Sheet
Sample Lesson Plan

Student Materials
Assignment Sheet: Leaven Through Chemical Reactions
Information Sheets: Leavening Through Chemical Reactions
Leavening White, Yellow, and Chocolate Cakes
Skill Builders: Words to Know
Baking Powder Leaveners
Acid and Baking Soda Leavening
Leavening Batter Cakes

TEACHER INFORMATION SHEET

Understand this science concept:

Sodium bicarbonate (baking soda) liberates carbon dioxide in the presence of an acid.

Baking powder and baking soda, plus an acid, are chemical leaveners. They are identified as chemical leaveners because of the chemical reaction that takes place to produce carbon dioxide gas when liquid is added.

Baking Soda

Because of the time required for gas formation from fermentation, early chemists experimented with producing gas to leaven baked products by combining baking soda (sodium bicarbonate, $NaHCO_3$) with various acids. Some of the food substances that contain acid which will form carbon dioxide gas (CO_2) when combined with baking soda are:

Sour Milk
Molasses
Brown Sugar
Honey
Corn Syrup
Maple Syrup
Chocolate

When baking soda and acidic foods are combined, they neutralize each other to produce carbon dioxide gas, water, and acid salts. The acid salts are residues which can give food products a bitter flavor when too much soda is used for the acidity of the food product. Two of the more acidic foods on the list are sour milk and molasses. The usual amount of baking soda to combine with 1 cup of fully soured milk is 1/2 teaspoon. Less baking soda is required when the milk is less acidic. Molasses also varies in acidity. It may require 1/2, 3/4, or 1 full teaspoon of baking soda to neutralize the acid and produce enough carbon dioxide to do a good job of leavening. Because the stronger flavor of molasses may cover up any undesirable bitter flavor resulting from too much soda, 1 teaspoon is often recommended for 1 cup molasses. The word formula for the chemical reaction of baking soda with acidic foods is:

Sodium Bicarbonate + Acidic Food --- Acid Salt + Water + Carbon Dioxide Gas
($NaHCO_3$) (CO_2)

Baking Powder

Baking powders belong in the same class of leaveners as baking soda because they give off carbon dioxide gas when combined with an acid. In the case of baking powders, the acid is in dry form, not acidic food, and is combined with sodium bicarbonate and a small amount of starch. The starch keeps the mixture of baking soda and acid chemicals dry until ready for use.

There are three types of baking powders - tartrate, phosphate, and S A S phosphate. They are classified by the type of acid chemical used in them. Tartrate baking powders contain cream of tartar, or tartaric acid, or a combination of the two. Phosphate powders have either monocalcium or monosodium phosphate as the acid. The third type of powder is classified as double action, combination, or S A S phosphate powder. It contains two acids to unite with soda. One of the acids is monocalcium phosphate (or another phosphate) and the other is sodium aluminum sulphate. Sodium aluminum sulphate does not give off much of its gas by wetting, but rather requires heat to complete the reaction.

The Dilutor in Baking Powder

Starch is usually added to baking powder to absorb moisture that might be present. It is also needed to coat the particles of soda and acid which might otherwise react. Starch helps to standardize the mixture. If only soda and acid were present, with nothing to dilute the strength, the yield of carbon dioxide would be too great and would be different for various types of baking powder, making their use in recipes difficult. In self-rising flour and mixes, the dilutor is flour.

CHARACTERISTICS OF BAKING POWDER

Tartrate Baking Powder

Tartrate baking powder contains cream of tartar and tartaric acid. It is called fast-acting because it releases carbon dioxide rapidly at room temperature. For this reason, when using fast-acting powder, the mixing period should be kept short and the amount of baking powder increased. Over-mixing can have harmful affects on fast-acting baking powder.

Phosphate Baking Powder

Baking powder containing the anhydrous form of monocalcium phosphate reacts slower than tartrate baking powder. This is because it is treated with heat to lower its rate of solution, and time is required for water to penetrate the coating of anhydrous salt. This delays the release of hydrogen ions. Doughs do not rise much during mixing because little carbon dioxide is released. However, they rapidly rise early in the baking period as more carbon dioxide is released through chemical reactions. Phosphate baking powder has found wide use in prepared flour products, butonly limited distribution in retail brands of baking powder.

S A S Phosphate Baking Powder

S A S hosphate is called double-acting baking powder because the sodium aluminum sulfate is combined with monocalcium phosphate monohydrate. This combination causes the baking powder to begin releasing carbon dioxide as soon as liquid is added, and again when heat is applied. About 85% of all baking powder sold on the retail market is double-acting.

SAMPLE LESSON PLAN

Science Concept: Leavening - Chemical
Task: Leaven Through Chemical Reactions

Objective: The student will be able to:

1. Name the chemical leaveners.
2. Explain the reactions of chemical leaveners.
3. List examples of foods that supply acid for a chemical reaction with baking soda.
4. Improve food products by using chemical leaveners correctly.

Teaching Aids:

- Baking Soda
- Tartrate Baking Powder
- Phosphate Baking Powder
- SAS Baking Powder
- Litmus Paper
- Vinegar
- Wax Pencil
- Molasses
- Buttermilk
- Fruit Juice
- Glasses
- Water
- Measuring Spoons

I. Preparation of the Learner:

Place baking soda in a dish and pass around the class for students to feel and taste. List their comments on the chalkboard.

Repeat this process using baking powder.

Baking powder and baking soda are chemical leavening agents.

II. Presentation:

CONCEPT	CLASSROOM ACTIVITY
Sodium bicarbonate liberates carbon dioxide in the presence of an acid	Lecture on chemical leaveners using Teacher Information Sheet as background.
Cream of tartar is an acid	Demonstration: Put 1/2 tsp. cream of tartar in a half glass of cold water. Stir to dissolve. Is there a reaction? Test with litmus paper. Is it an acid or a base? Add 1/2 tsp. of baking soda to the cream of tartar solution. Be sure to use a clean spoon for each solution. Do not put a wet spoon in the box. Is there any reaction? What is released from the mixture?
Tartaric baking powder produces carbon dioxide immediately when moistened	Put 1/2 tsp. of tartaric baking powder in 1/2 glass of cold water. How long does it take the reaction to start? How long

II. Presentation:

CONCEPT	CLASSROOM ACTIVITY
Batters using cream of tartar baking powder must be baked immediately	before the reaction is over?
Double-acting baking powder produces carbon dioxide when exposed to moisture and again when exposed to heat	Fill one glass half-full with cold water and a second glass half-full with hot water. Add 1/2 tsp. of double-acting baking powder to each glass. In which glass is the reaction stronger? When no more bubbles are coming out in the first glass, heat the solution in a pan. Is there a second reaction? Explain to the students that double-acting baking powder was developed containing two acid powders. It has a quick-acting acid powder, like cream of tartar, that starts releasing carbon dioxide as soon as it is mixed with a liquid. It also contains sodium aluminum sulfate to release more carbon dioxide when it is baked. * These science experiments were taken from: Vicki Cobb, *Science Experiments You Can Eat* (New York, NY: J.B. Lippencott. 1972).
Baking soda when combined with an acidic food will produce carbon dioxide	Demonstration: Put 1/2 tsp. baking soda in 1/2 glass of the following: Molasses Buttermilk Fruit Juice Vinegar Using a wax marking pencil, mark the liquid level before and after adding the baking soda. Measure the results and record on the chalkboard. Review vocabulary words. Read Information Sheets.

III. Application:

Have students complete Skill Builders on the assignment sheet individually or in groups.

IV. Evaluation:

TEST - CHEMICAL LEAVENING

1. When using sour milk or buttermilk to make quick breads, what leavening agent would most likely be used?

____

2. What chemical reaction occurs when baking powder is combined with a liquid?

____

____

True or False

3._____ When using double-acting baking powder, leavening action does not begin until the cake is placed into the oven.

4._____ Buttermilk and sour milk can replace each other in recipes.

5._____ Recipes that require high oven temperatures need single-acting baking powder.

If your cake fails, you should be aware of the causes for the failure. Give at least one cause for each of these problems.

6. Peaked or cracked in the middle:____________________

7. Falls in the middle:____________________

8. Chocolate cake is not red enough in color:____________________

9. Taste is soapy and bitter:____________________

ASSIGNMENT SHEET

Science Concept: Leavening - Chemical

Task: Leaven Through Chemical Reactions

Why Learn This:

Understanding the chemical reaction that takes place when using baking powder and baking soda to leaven will give you the ability to produce products of good quality.

Principle Emphasized:

Sodium bicarbonate (baking soda) liberates carbon dioxide in the presence of an acid

Words to Know:

Acid
Alkali
Baking Powder
Baking Soda
Buttermilk
Carbon Dioxide (CO_2)
Dilutor

Resources: Information Sheets - Leavening with Chemical Reactions
- Leavening Yellow, White, and Chocolate Cakes

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1. Read the resources
2. Complete Skill Builder - Words to Know
3. Complete Skill Builder - Baking Powder Leaveners
4. Complete Skill Builder - Acid and Baking Soda Leavening
5. Complete Skill Builder - Leavening Batter Cakes

INFORMATION SHEET

LEAVENING THROUGH CHEMICAL REACTIONS

Chemical leavening does scientifically what yeast leavening does naturally. Yeast produces carbon dioxide (CO_2) gas slowly and leavens over several hours. Chemical leavening produces CO_2 gas quickly and leavens within 15 minutes. Chemical action is used to leaven quickbreads, cookies, and some cakes. These products are leavened in two ways:

1. By using commercially prepared chemical leavener (such as baking powder)
2. By creating the leavener within the batter using common ingredients

Both of these methods are based on a balance between acid and alkaline compounds. When alkalis and acids combine, they react and fizz creating CO_2 bubbles. When these bubbles are trapped in a batter and are baked, the air cells created by the bubbles become permanent. These cells create the texture and grain of the product.

Baking Soda

Many recipes call for balancing the alkali and acid ingredients using common foods. Examples of acid ingredients are: buttermilk, fruits and fruit juices, lemon juice, milk, molasses, and vinegar. These foods are often added to a batter for special flavors. The acid of the ingredients must be balanced with an alkali to create the CO_2 gas for leavening action. The alkali used is always baking soda.

Baking soda plus liquid acid ingredient = CO_2 gas bubbles

The results from using this method are sometimes unpredictable because the acidity of the ingredients varies, and it is difficult to determine the correct amount of soda to use. If more soda is used than needed to neutralize the acid, the batter will be alkaline, have yellow color, and taste soapy and bitter. General ratios for ingredients are:

Alkali	+	Acid
1/2 tsp. baking soda		1 cup sour milk or buttermilk
1 tsp. baking soda		1 cup molasses
1/2 tsp. baking soda		1 tbsp. vinegar or lemon juice

Baking soda must be added to the other dry ingredients in the recipe. Do not add the liquid ingredients in a recipe to the dry ingredients until ready for the leavening action. Once the dry and liquid ingredients are mixed, the chemical reaction starts quickly, and CO_2 gas bubbles are formed. Bake the product within a few minutes while, the acid/alkali reaction is still in process, to set the product before the CO_2 bubbles disappear. Be sure to preheat the oven so it is ready ahead of the final mixing.

Bakery recipes are very carefully balanced and should not be tampered with unless you fully understand the alkali-acid reactions. Many times an inexperienced cook has decided to substitute buttermilk for sweet milk in pancakes or to put into a quickbread extra ingredients such as raisins or apples and the finished product was heavy with low volume. These foods did not leaven properly because the acid-alkali balance was upset. Realize that when you change recipes you are changing a balanced chemical formula.

Baking Powder

Baking powders were developed to give the cook a source of acid and alkali to leaven products when the flavors of sour milk, molasses, or vinegar are not desired. Baking powders have taken some of the guesswork out of baking. All baking powders are a combination of baking soda plus a dry acid ingredient. The acid ingredient varies somewhat to speed up or slow down the reaction.

Acid Used	Brand Name	Stages	Speed
Tartaric Acid	Swansdown Royal	Single-acting	Fast-acting
SAS-Phosphate	Calumet Clabber Girl	Double-acting	Slow-acting

Single-acting baking powders react as soon as they are combined with the liquid ingredients in the recipe. They react quickly and must be baked soon after mixing to set the leavening bubbles permanently.

Baking Powder + Liquid = CO_2 gas bubbles

Double-acting baking powders have two different kinds of acid ingredients. One of the acids starts to react as soon as it is combined with the liquid ingredients in the recipe. The other acid ingredient does not start to react until activated by heat in the oven. This type is called slow-acting because of the two-stage leavening. About one-third of the leavening occurs at room temperature and two-thirds in the oven.

Baking Powder + Liquid + Heat = CO_2 gas bubbles

The slow-acting type baking powders allow the cook more time between mixing and baking but require lower oven temperatures than fast-acting powders. The lower temperatures give more time for leavening action in the oven before the structure of the product is set. Recipes that require a high oven setting need single-acting baking powders. Some guidelines in using and substituting baking powders are:

	TYPE	USE
I.	SAS-Phosphate Baking Powder	1 1/2 tsp. per cup flour
	Tartrate Baking Powder	2 tsp. per cup flour

II. To substitute one type for the other:

1 tsp. SAS = 1 1/4 tsp. Tartrate

III. If commercial baking powders are not available, a leavener may be mixed by the following methods:

1. 1/2 tsp. baking soda plus 1 1/4 tsp. cream of tartar
2. 1/2 tsp. baking soda plus 1 cup sour milk
3. 2 tsp. tartrate baking powder plus 1 cup sweet milk

IV. To substitute 1 cup sour milk for 1 cup sweet milk, either for flavor or out of necessity:

Reduce recipe by 2 tsp. baking powder; add 1/2 tsp. baking soda to dry ingredients

V. Sour milk adds a distinct flavor to batters. To make 1 cup sour milk, pour one of the following ingredients into a measuring cup and fill with milk to the 1 cup mark.

1 tbsp. vinegar

OR

1 tbsp. lemon juice

OR

1 3/4 tsp. cream of tartar

INFORMATION SHEET

LEAVENING

WHITE, YELLOW, AND CHOCOLATE CAKES

White, yellow, and chocolate cakes vary from each other in that white cakes use just the egg whites, and yellow cakes include the whole egg in their ingredients. White, yellow, and chocolate cakes use about the same amount and kind of eggs, liquid, fat, and other ingredients. Standard cakes have 1/3 as much fat as sugar, 2/3 as much milk as sugar, and about 3 times as much flour as liquid.

Types of Leaveners

These three types of cakes differ most from each other in the kind of chemical leavening used. White and yellow cakes are leavened by baking powder which provides a balanced acid-alkali combination. Chocolate cakes are often leavened by baking soda in place of, or in addition to, baking powder. This is because cocoa and chocolate are slightly acidic and need to be neutralized by baking soda.

Chocolate Cakes

Many chocolate cakes also call for buttermilk and baking soda rather than baking soda alone. The chemical reaction that results influences the color of the cake. The color changes from medium brown to red brown as more soda is used and less acid, in this case buttermilk, is used. Devils food cake is reddish due to the high soda content. They also have a slight soapy taste due to the high alkalinity of the mixture. Check the ratio of acid to alkali ingredients in chocolate cakes to predict color and taste. These cakes may also be richer in fat and sugar and require slightly less flour than white or yellow cakes.

Baking Chemically Leavened Cakes

The release of carbon dioxide to leaven a product should occur before a crust is formed or cracks will develop in the product. The crust forms when the baking period is half over. It is important that the product reach full size before that happens. If rising occurs afterward, that is when cracks appear in the surface of the food. High oven temperatures cause this to happen. Cracks will appear on the top of muffins, cakes, and quickbreads, and on the sides of biscuits. For this reason, lower oven temperatures are used for slow-acting baking powders. This allows the most expansion of the food before the structure or crust is set.

SKILL BUILDER

WORDS TO KNOW

Directions:

Use each of the following words in two sentences related to food preparation.

Acid

1.

2.

Alkali

1.

2.

Baking Powder

1.

2.

Baking Soda

1.

2.

Buttermilk

1.

2.

Carbon Dioxide (CO_2)

1.

2.

Dilutor

1.

2.

SKILL BUILDER

BAKING POWDER LEAVENERS

Directions:

1. Collect a variety of baking powder cans and packages.

2. List the ingredients given on the labels in the proper spaces of the chart. Note that the alkali ingredient will always be baking soda. "Other Ingredients" will usually be cornstarch, flour,or some other material to keep the product dry so that it does not start to react chemically in the container. Acid ingredients will be tartrate, phosphate,or sodium aluminum sulfate. Tartrate is fast-acting; phosphates and sodium aluminum sulfate (SAS) are slow acting. When only one acid is listed, the acid is usually activated when it combines with the liquid in the recipe. These are single-acting leaveners. When two acids are listed, one reacts when combined with the liquid ingredients in mixing, and the other reacts when heat is applied in the oven. Leaveners of this type are double-acting.

BRAND NAME	ACID INGREDIENTS	ALKALI INGREDIENTS	OTHER INGREDIENTS	TYPE OF ACTION

SKILL BUILDER

ACID AND BAKING SODA LEAVENING

The activity shows the variety of acidic foods that can be used in standard recipes. It should also indicate that the ratio of ingredients varies in recipes because the food varies in degree of acidity. When the recipe shows a small amount of acid and baking soda in proportion to the amount of flour, some other leavener is used as a supplement. Why do some recipes call for baking soda, acid, and baking powder? When this happens, the baking powder is used as a substitute for some of the other leaveners in order to reduce the amount of liquid in the recipe or to prevent a too strong flavor that would be caused by the soda and acid ingredients.

Directions:

Select one recipe each for making biscuits, pancakes, muffins, fruit and nut breads, and cake. The leavening agent in the recipes should be baking soda and an acid ingredient. Do not select recipes that use baking powder. Using the recipes, fill in the chart below according to the example.

RECIPE NAME	SOURCE	ACID INGREDIENT AMT.	KIND	AMT. BAK. SODA	AMT. FLOUR	OTHER LEAVENERS
Example: Applesauce Cake	Betty Crocker	1 C.	Applesauce	1 tsp.	2 C.	2 Eggs

Examples of acid ingredients: sour milk, buttermilk, yogurt, sour cream, raisins, apples, fruits, fruit juices

Examples of other leaveners: eggs (whole or separated), baking powder, sifting, creaming, whipping for extended times

SKILL BUILDER

LEAVENING BATTER CAKES

Directions:

Select basic recipes for the following cakes. Fill out the chart listing the ingredients and quantities for one standard cake. On another sheet of paper, describe the similarities and differences between leavening processes.

CAKE TYPE	CHARACTERISTICS	EGGS	COMMERCIAL LEAVENER	LIQUID	FAT	OTHER INGREDIENTS	DESCRIBE LEAVENING PROCESS
White							
Yellow							
Chocolate							

a bird's eye view

LEAVENING WITH STEAM AND AIR

Understand these science concepts:

Air expands when heated.

Heat changes liquid into steam.

Steam occupies more space than liquids.

Teacher Materials
Information Sheet
Sample Lesson Plan

Student Materials

Assignment Sheet:	Leaven with Air and Steam
Information Sheets:	Leavening Using Air and Steam Steam Leavening - Successful Popovers Air Leavening - Successful Foams Air Leavening - Successful Air Leavened Cakes
Skill Builders:	Words to Know Leavening with Steam Leavening with Air Incorporating Air by Creaming Analyzing Leaveners in Cakes

TEACHER INFORMATION SHEET

Understand these science concepts:

Air expands when heated.

Heat changes liquids into steam.

Steam occupies more space than liquids.

Definition: LEAVENING AGENT - A substance used to make food light and porous.

Ways to Leaven Food

Foods can be leavened with steam, air, or carbon dioxide. Most products have more than one leavener. All three expand when heated and it is the trapping of these expanded gases in the structure of a food product that causes the product to be leavened. Leavening agents are identified as:

Physical - Air and Steam
Chemical - Baking Powder, Soda, and Acid
Biological - Yeast

Leavening with Air

Air can be mixed into doughs, batters, and eggs. It will be trapped in the cell structure of the food product and expand during cooking. The more air trapped, the lighter the texture of the product. Flour and eggs in a food product coagulate during cooking and form the structure.

Air can be mixed into a food product by various methods:

- It may be incorporated by beating a batter.
- Air may be added to batter by creaming sugar, shortening, and eggs.
- Air can be incorporated into eggs, especially egg whites, by whipping. The foam made by beating egg whites becomes the foundation for sponge and chiffon cakes, meringues, and souffles. Egg foam can be folded into batters causing them to have a lighter texture.

Leavening with Steam

Steam forms in batters containing liquid. Like air, it is trapped in the cell structure causing the food product to be leavened. As the liquid is heated and turns to steam, it expands. Steam occupies much more space than liquid. Steam can produce dramatic results in products such as popovers and cream puffs. To make these products, the mixture is beaten to produce the gluten necessary for the framework - a framework to support the large, thin, hollow shells.

SAMPLE LESSON PLAN

Science Concept: Leavening - Physical
Task: Leaven with Air and Steam

Objective: The student will be able to:

1. Explain how air and steam leavens food products
2. Improve food products by using the proper techniques to leaven with air and steam

Teaching Aids:

- Rulers
- Balloons
- Heat Source
- Covered Saucepan
- Water
- Ingredients for Popovers
- Ingredients for Puffy Omelet
- Ingredients for Pound Cake

I. Preparation of the Learner:

What is a leavening agent? (A substance used to make food products light and porous)

What are the three leavening agents? (Steam, Air, Carbon Dioxide)

A thorough understanding of how gases and steam leaven foods will improve your ability to produce a quality product.

II. Presentation:

CONCEPT	CLASSROOM ACTIVITY
Air expands when heated. This expansion of air can be used to leaven foods.	Discuss the process of expansion of gases with students. Explain that air leavened products are made up of many air cells (like balloons) that expand when heated. This expansion increases the volume of the food product making it larger, lighter, and usually more palatable. Experiment: Blow a balloon up tightly and tie it. Hold the balloon about one foot above a heat source. The balloon will expand and finally burst.
Heat changes liquids into steam. Steam occupies more space than liquid. Steam expanding in the structure of a food product can be used to leaven foods.	Explain that the liquids in products (including eggs, water, milk, juices, fruits, and fats) expand, vaporize, and cause rising action. Explain that air and steam work hand-in-hand to leaven because each air bubble is surrounded by a structure containing some moisture. The air in the bubble and the cell wall both expand to

II. Presentation:

CONCEPT	CLASSROOM ACTIVITY
	form the airy texture. Water vapor (steam) has three times as much leavening power as air. Experiment: Place water in a saucepan, cover with the lid, bring to a boil over the heat source. Have students observe how the lid bounces and steam sprays out from under the lid, indicating expansion. Review vocabulary words.

III. Application:

Have students individually complete Skill Builders on the Student Assignment sheet.

OR

Have students complete Skill Builders as a class activity.

IV. Evaluation

TEST - AIR AND STEAM LEAVENING

True or False

1._____ An angel food cake is leavened with baking powder.

2._____ The purpose for creaming sugar and shortening when baking a cake is to incorporate air.

3._____ Air can be used to leaven a cake.

4._____ Egg white foam is whipped into some cake batters to incorporate air for leavening.

5._____ Popovers are leavened by air.

6._____ Liquids change to steam and expand when heated.

7._____ Air leavening is used mainly in products containing a large amount of egg.

8._____ Pie crusts are leavened with air.

ASSIGNMENT SHEET

Science Concept: Leavening - Physical

Task: Leaven with Air and Steam

Why learn this?

If you were to order a lemon souffle at a restaurant, the biggest share of the cost would not be for the ingredients, but for the skill in preparing it. Leavening with air and steam requires special food preparation techniques. A thorough understanding of how to add air to mixtures and how to cook air and steam leavened products can make you a valuable employee in the food service industry.

Principle Emphasized:

Air expands when heated.
Heat changes liquid into steam.
Steam occupies more space than liquid.

Words to Know:

- Albumen
- Angel Food Cake
- Biological
- Carbon Dioxide
- Chemical
- Chiffon Cake
- Cream
- Cream Puff
- Foam
- Fold
- Gluten
- Leavening Agent
- Meringue
- Physical
- Popover
- Pound Cake
- Souffle
- Sponge Cake
- Texture
- Vapor
- Whip

Resources: Information Sheets -
Leavening Using Air and Steam
Steam Leavening - Successful Popovers
Air Leavening - Successful Foams
Air Leavening - Successful Air Leavened Cakes

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1. Read the resources
2. Complete Skill Builder - Words to Know
3. Complete Skill Builder - Leavening with Steam
4. Complete Skill Builder - Leavening with Air
5. Complete Skill Builder - Incorporating Air by Creaming
6. Complete Skill Builder - Analyzing Leaveners in Cakes

INFORMATION SHEET

LEAVENING USING STEAM AND AIR

Steam

Steam is a powerful leavening force. When water is heated it changes into steam and increases in volume 1,600 times. Nearly all products are leavened partially with steam because all products have moisture in them. Steam can come from any liquid such as eggs, milk, water, juices, and fats. When this moisture comes in contact with the heat source, the heat turns the moisture into steam. The steam puffs up the product as it tries to escape.

Cream puffs and popovers are leavened by steam. Their batters have a high percentage of liquid and are baked at high oven temperatures to form steam rapidly, puff the batter, and then form a hollow crust. Popovers and cream puffs both have hollow centers caused by the force of steam.

Pie crusts are also leavened with steam. Water is added to the flour-salt-fat mixture to bind the ingredients together to make a dough. When the dough is rolled out and baked, the water in the crust changes to steam, expands,and puffs the layers of fat and flour apart. This results in a flaky crust. Single baked pie crust shells are often pricked so that in the baking process large air bubbles cannot form behind the crust.

Air

Air is forced into products by mechanically whipping, beating, folding, creaming, or sifting. All these methods are ways of lifting and separating the mixture and trapping air pockets inside it.

Air leavening is used mostly in products containing a large amount of egg. Products of this kind are leavened approximately two-thirds by steam from the moisture in the eggs and about one-third by air trapped through whipping. When the eggs are whipped or creamed into a mixture they fluff and make a structure of elastic air cells. When these cells are subjected to heat, the air in the cells expands. The moisture in the bubble-like cells vaporizes and causes even more expansion.

Pound cake is a good example of an air and steam leavened cake that uses trapped air from the creaming process and moisture from the eggs. The creaming process involves beating the fat, sugar, and eggs together with an electric mixer for as long as ten minutes.

Many products are leavened by egg white foams. These include: chiffon, sponge, and angel food cakes; omelets and souffles; and meringues. Egg white foams are whipped to a high volume. The foam is then gently folded into whatever batter is being made. When the batter is baked, the trapped air expands and steam leavening takes over to further increase the volume.

Meringues are related to this group because they are an egg white foam. They differ in that they are a foam of sugar and egg whites. Meringues are sometimes folded into a batter. Other times they are used as a topping for cream pies. How the egg white foam is folded into the batter is the key to success with these products. The egg whites must be pure, and the foam must be correctly folded into the batter.

Air and steam go hand-in-hand to leaven many products. The air is incorporated by whipping, and when the product is baked, the moisture in it turns to steam. Air and steam leavening is so effective that many products need no other type of leavener.

INFORMATION SHEET

STEAM LEAVENING -
SUCCESSFUL POPOVERS

Preparing Batter

Popovers are shells that are almost hollow. They are crisp and brown outside, and moist inside. They are made of a thin batter which contains flour, milk, and eggs. The leavening agent is steam which is produced from the liquid. The steam is held by the shell which is formed in the oven from the egg and flour.

Popovers increase in size with the amount of egg used. Three eggs make a larger popover than two. The effect of eggs in increasing the size (volume) of popovers is due largely to the egg whites. Although fat is not a required ingredient, it may improve taste and tenderness of the popover. Too much fat decreases the size of the product by letting steam escape through areas of melted fat.

Baking

During baking, a crust must form early to hold in steam. As baking continues, the steam expands the batter and the volume of the popover increases. After maximum volume is reached, the popover must become firm enough that it does not collapse when it is removed from the oven. A moderate oven temperature can be used if the heat is evenly maintained or increased during the expansion of the popover. However, a hot oven is most often used. The oven temperature may be decreased toward the end of baking to let the popover dry out without becoming too brown.

INFORMATION SHEET

AIR LEAVENING-
SUCCESSFUL FOAMS

What is a foam?

The foaming of egg whites plays an important role in many food products. It makes the product light in texture and adds leavening power. Egg white foam consists of bubbles of air surrounded by albumen. The drying and stretching of albumen during beating makes some of the albumen insoluable, thus stiffening and stabilizing the foam. Overbeating will add too much air. This stretches the albumen so it becomes thin and less elastic. Elasticity is needed in foams that are to be baked. The elasticity allows the trapped air to expand without breaking the cell walls before the albumen is coagulated by the heat of the oven.

Beating Egg Foams

In order to whip egg foam to full volume, the eggs should be at room temperature. Equipment that comes in contact with the egg whites must be clean and free of grease, dirt, egg yolk, and water, otherwise the whites will not beat well.

Egg whites should be whipped to stiff peaks with an electric mixer. Stiff peaks stand straight up when lifted with a spatula, have little or no curl at the tip, and have a shining appearance.

Folding Foams into a Batter to Help Leaven a Food Product

The correct folding procedure for egg foams is to pour the liquid batter over the stiffly beaten whites. The two mixtures are folded together with a rolling over-and-under motion. Never use a stirring motion. Cut down through the center of the batter, scrape across the bottom of the bowl, bring the utensil up the other side of the bowl,and roll the contents over the top of the batter. Continue until both mixtures are completely mixed. No large lumps of egg foam should remain. If the egg whites are stirred in rather than folded, the air cells in the foam are destroyed. When this happens there is little air leavening action.

INFORMATION SHEET

AIR LEAVENING -

SUCCESSFUL AIR LEAVENED CAKES

While air leavened cakes such as angel food, sponge, pound, and chiffon share many of the same ingredients and characteristics, knowing about thier basic and important differences will help you prepare them successfully.

Angel Food Cake

This is a high volume foam cake prepared in a tube pan. It averages 12 egg whites whipped to foam and folded in or added as a meringue to the other ingredients. Angel food recipes call for neither commercial leavener nor additional liquid or fat besides that provided by the egg. Ingredients in addition to egg whites include sugar, flour, and seasonings. Angel food cakes have a low amount of flour as compared to other cakes. The cake is leavened by a whipped egg white foam of trapped air cells and steam from the egg moisture.

Sponge Cake

This is a foam cake prepared in a regular baking cake pan or in a jelly roll pan. Approximately 6 eggs are used in the mixture. They may be added by whipping the whole egg for five or more minutes until it is very thick and stiff, or by separating the yolks and whites, whipping the whites to a stiff foam, and adding them as in an angel food cake. No commercial leavener is used. If baking powder is listed, it is because fewer than 6 eggs are used and the baking powder is a supplement. Extra liquid is required when baking powder is supplemented for egg volume. The true sponge cake is leavened by the air incorporated in the egg mixture and by the steam from egg moisture. When additional liquid is used, it is usually water. No fat is used in the recipe. Milk is seldom used in sponge cake recipes because of the fat content in milk. Fat prevents good foam development in egg whites. The sponge cake has a lower volume than cakes made without egg yolk because the fat in the yolk interferes with maximum egg foam volume.

Chiffon Cake

This is a foam cake made in a tube pan. It has a higher volume than sponge cake and a lower volume than angel food cake. Approximately 6 eggs are used in the recipe. The whites are separated from the yolks and beaten to a foam. The major difference between the sponge and chiffon cakes is that the chiffon calls for oil. Because oil is used, baking powder is required to help leaven. Oil slows down the leavening properties of egg foam. However, the oil gives the cake a richer taste and more tender texture.

Pound Cake

This cake is named because it is made from approximately one pound each of flour, eggs, shortening, and other ingredients. Despite its name, pound cake is not heavy. The texture is similar to a sponge cake but is much richer tasting and tender because of the shortening. The whole eggs are creamed into the sugar and shortening until the mixture is thick and lemon colored (8-10 minutes). *The creaming process is very important to developing the air leavening.* A true pound cake contains no commercial leaveners, but baking powder is sometimes added as a supplement when fewer than six eggs are used. Pound cake is baked in loaf pans.

SKILL BUILDER

WORDS TO KNOW

Directions:

Complete the following crossword puzzle using the Words to Know list.

Words to Know:

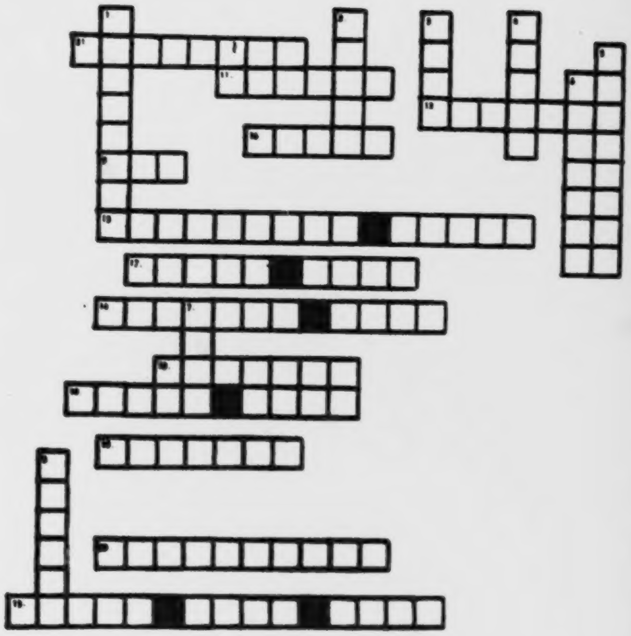
Albumen
Angel Food Cake
Biological
Carbon Dioxide(CO_2)
Chemical
Chiffon Cake
Cream
Cream Puff
Foam
Fold
Gluten
Leavening Agent
Meringue
Physical
Popover
Pound Cake
Souffle
Sponge Cake
Texture
Vapor
Whip

Down

1. Relationship of molecules and atoms
2. Combining sugar, fat, eggs
3. To beat rapidly to incorporate air
4. Steam
5. Egg white sugar foam
6. Grain
7. Lift and turn over
8. Insoluable protein with elastic qualities

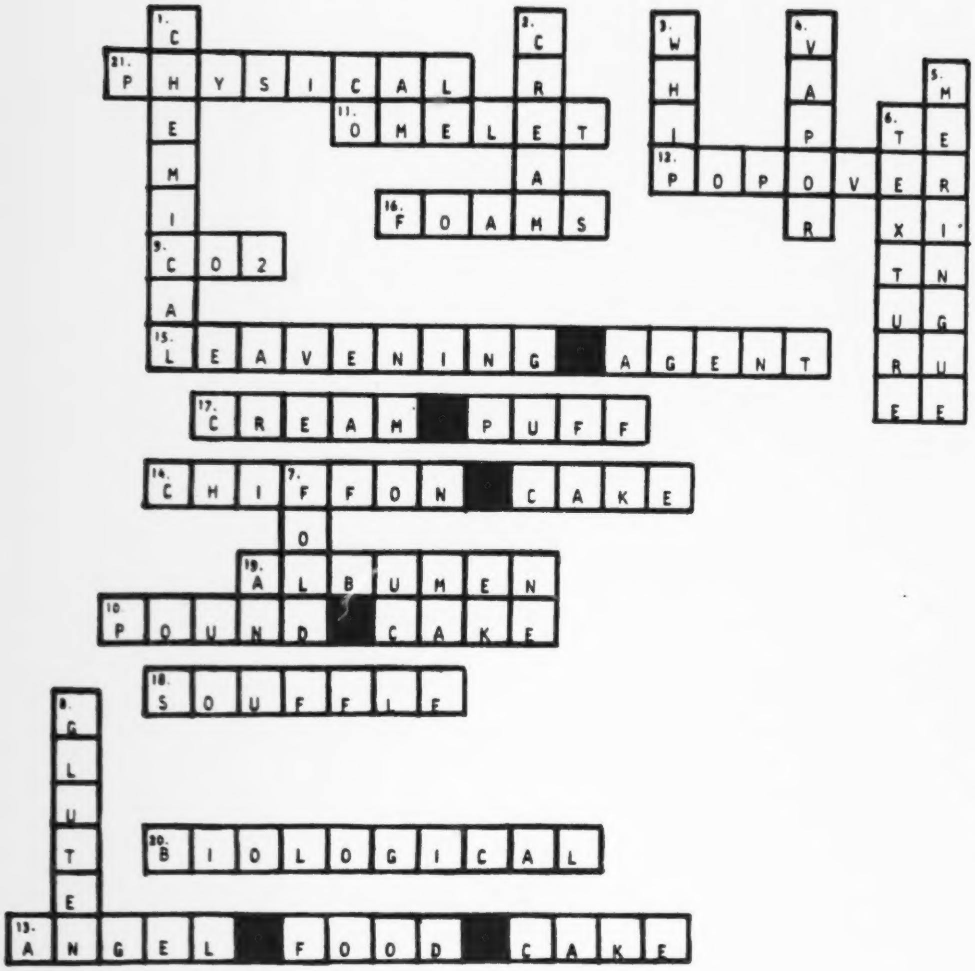
Across

9. Carbon Dioxide
10. A cake using creaming to incorporate air
11. Whipped, fried, or baked egg
12. Hollow muffin
13. Cake leavened with egg foam
14. An air leavened cake containing oil
15. An ingredient to make a product rise
16. Whipped egg whites
17. Hollow dessert shell
18. Egg dish made with white sauce, egg yolks, and whipped egg whites
19. White of an egg
20. Living matter
21. Natural change



WORD PUZZLE

ANSWER KEY


1. CHEMICAL
2. CREAM
3. WHIP
4. VAPOR
5. MERINGUE
6. TEXTURE
7. FOLD
8. GLUTEN
9. CO2
10. POUND CAKE
11. OMELET
12. POPOVER
13. ANGEL FOOD CAKE
14. CHIFFON CAKE
15. LEAVENING AGENT
16. FOAMS
17. CREAM PUFF
18. SOUFFLE
19. ALBUMEN
20. BIOLOGICAL
21. PHYSICAL

SKILL BUILDER

LEAVENING WITH STEAM

Popovers

Popovers have a high proportion of liquid and eggs to flour. The recipe also calls for a high baking temperature. These are ideal conditions for producing steam to leaven the popover.

2 eggs
1 cup milk
1 cup sifted flour
1/2 tsp. salt
1 tbsp. melted shortening

Preheat two ovens - one set at 450°F and one set at 350°F. Place eggs in bowl; add milk, flour, and salt. Beat 1 1/2 minutes with rotary beater or electric mixer. Add melted shortening. Beat 1/2 minute.

Fill 6 well-greased custard cups 1/2 full. Bake in the 450° oven for 15 minutes. Reduce heat to 350° and continue baking for 30 minutes. A few minutes before removing from oven, prick each popover with a fork to let steam escape.

1. Prepare according to recipe above. Bake three popovers at 350°F for the entire time.
2. Prepare popovers as in #1 but increase recipe to 3 eggs.
3. Prepare popovers as in #1 but use 1 egg.
4. Prepare popovers as in #1 but use 2 egg whites.
5. Prepare popovers as in #1 but use 4 egg yolks.

Using the chart and a ruler, record and compare the expansion of the popovers.

	2 eggs	3 eggs	1 egg	egg whites	egg yolks
Hot Oven					
Moderate Oven					

SKILL BUILDER

LEAVENING WITH AIR

Omelet

Puffy omelets, souffles, and angel food, sponge, and chiffon cakes all use the process of folding egg foams into the batter for leavening.

2 eggs	
dash of	salt
dash of	pepper
2 tbs	milk

Preheat oven to 300°F. Separate eggs. Combine yolks, salt, pepper, and milk. Beat until lemon in color. Whip egg whites until they stand in stiff peaks. Pour egg yolk mixture over whites and fold in until smooth.

1. Fill 2 greased custard cups with one inch of omelet mixture. Bake at 300°F until brown and puffy.
2. Beat the remaining mixture with wooden spoon for one minute. Fill 2 greased custard cups with one inch of omelet mixture. Bake at 300°F until brown and puffy.

When omelets are removed from the oven, measure with a ruler the amount of expansion (leavening) that occurred.

#1______________________________

#2______________________________

Explain any differences or likenesses in the two sets of omelets.

____

____

____

____

____

SKILL BUILDER

INCORPORATING AIR BY CREAMING

Pound Cake

Creaming is the mixing together of one or more foods until soft and creamy. Pound cake requires creaming of fat and sugar to add air for leavening. Eggs are creamed into the fat/sugar mixture to help stabilize it.

1/4 cup butter
1/4 cup margarine
1/4 cup shortening
1 1/2 cup sugar
2 eggs
1 1/2 cup sifted cake flour
1/2 cup milk
1/2 tsp vanilla
1/4 tsp salt

Preheat oven to 325°F.

1. Cream sugar and fat with the electric mixer for 1 minute. Using a ruler, measure and record volume. Cream for 5 more minutes and measure volume again.

   After 1 minute:____________________

   After 5 minutes:____________________

2. Beat in one egg at a time. Sift flour and salt together. Add one-half cup flour and one-half cup milk; repeat. Add vanilla. Bake at 325°F for 1 hour 30 minutes. Bake in a 9 x 5 inch loaf pan.

   After the batter is in the pan, measure the depth with a ruler. Bake the cake and measure the depth again. Compare results.

   Before baking:____________________

   After baking:____________________

   Explain how this cake is leavened:____________________

   ____

   ____

3. Slice the cake and describe the texture:____________________

   ____

SKILL BUILDER

ANALYZING LEAVENERS IN CAKES

Directions:

1. Select basic recipes for making the following cakes. Fill in the chart listing the ingredients and quantities for one standard cake. Under "eggs," specify whether they are whole or separated and how they are to be added to the batter.

2. On the back of the chart, describe the likenesses and differences among the types of cakes including how they are prepared and the ingredients used.

Cake Type	Characteristics	Eggs	Commercial Leavener	Liquid	Fat	Other Ingredients	Describe Leavening Process
Angel Food							
Sponge							
Chiffon							
Pound							

a bird's eye view

LEAVENING WITH YEAST

Understand this science concept:

Yeast ferments sugar to form carbon dioxide gas and alcohol. The expanding gas gives flour products an airy texture when set by heat.

$$\underset{\text{(sugar)}}{C_6H_{12}O_6} + \text{Yeast} - \underset{\text{(carbon dioxide)}}{2CO_2} + \underset{\text{(alcohol)}}{2C_2H_5OH}$$

Teacher Materials

Information Sheet
Sample Lesson Plan

Student Materials

Assignment Sheet:	Leaven with Yeast
Information Sheet:	Leavening with Yeast
Skill Builders:	Words to Know Proofing

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TEACHER INFORMATION SHEET

Understand this science concept:

Yeast ferments sugar to form carbon dioxide gas and alcohol. The expanding gas gives flour products an airy texture when set by heat.

$$\underset{\text{(sugar)}}{C_6H_{12}O_6} + \text{Yeast} - \underset{\text{(carbon dioxide)}}{2CO_2} + \underset{\text{(alcohol)}}{2C_2H_5OH}$$

Most breads are leavened by yeast. A few are leavened by salt-rising bacteria.

Yeast as a Leavener

Yeast leavening involves the process of fermentation. In this process yeast, which is a simple plant form, secretes the enzyme zymase. This enzyme acts as a catalyst to change sugar into alcohol and carbon dioxide. The carbon dioxide formed is trapped in the dough, making it light and porous. The carbon dioxide produced results from the following reaction:

$$C_6H_{12}O_6 + \text{Yeast} - 2CO_2 + 2C_2H_5OH$$

When bread is baked, the heat evaporates the alcohol. It also expands the bubbles of carbon dioxide caught in the dough, causing it to become more porous and light.

Types of Yeast

Yeast is sold in two forms:

1. Active dry yeast
2. Compressed yeast cakes

Active dry yeast does not require refrigeration but should be used before the expiration date stamped on the package. Dry yeast will retain its activity longer if stored in a refrigerator. Best results are obtained when active dry yeast is dissolved in water between 104°F - 113°F.

Compressed yeast must be refrigerated. It keeps for only one or two weeks unless frozen. Freezing preserves the biological activity for several months. Cakes of compressed yeast are activated by crumbling them into lukewarm water or other liquids.

Sugar for Fermentation

The sugar needed for the action of yeast comes from the flour and added sugar. When bread is made with no additional sugar, sufficient sugar for the yeast action is supplied from the flour, which contains about one percent sugar, and from maltose produced by the action of the amylase of flour on starch.

SAMPLE LESSON PLAN

Science Concept: Leavening - Biological
Task: Leaven with Yeast

Objective: The student will be able to:

1. Describe the reaction that occurs from yeast fermentation
2. Improve food products by using the proper techniques and conditions to leaven with yeast

Teaching Aids:

4 Food Probe Thermometers
3 tsp Dry Yeast
1 tsp Sugar
1 tsp Salt
Ingredients for Yeast Dough
Baker Scales
Proofing Cabinet
4 Containers
3 Glasses

I. Preparation of the Learner:

Yeast is a living organism and likes an environment similar to the one we like. Yeast likes to be warm, to have food and water, and to have time to grow. For the best growth, it is important to use the correct temperature of water for dissolving yeast and for proofing the product.

II. Presentation:

CONCEPT	CLASSROOM ACTIVITY
Yeast needs warm temperatures to produce maximum leavening	Demonstration: Place four containers of water on a counter. Have the water at varying temperatures. Have students dip their wrists in each container and determine whether the water is warmer, cooler, or the same as their own body temperature. Use a thermometer to check the temperature of each container of water. Review the guidelines for yeast growth: 60-70°F - Slow Growth 80°F - Normal Growth 90-100°F - Fast Growth 140°F - Yeast is Killed Yeast is active at some temperatures and is killed when the temperature reaches 140°F. After this point the yeast is dead and cannot be used to leaven.

II. Presentation: (Cont'd)

CONCEPT	CLASSROOM ACTIVITIES
	Set up the laboratory proof cabinet. Cover the thermometer dial with paper. Have students determine when the temperature of the proof cabinet is ready by comparing its temperature with their own body temperature. When the students have reached agreement, uncover the proof cabinet thermometer and evaluate their judgement. Continue the process until students are able to judge with accuracy the correct temperature of water and of the proof cabinet for yeast growth.
Sugar provides food for yeast fermentation; salt slows the fermentation of yeast	Set up three identical glasses of warm water. Use a thermometer to check the water temperatures; they must be the same. 1. Add 1 tsp salt to one glass of water 2. Add 1 tsp sugar to one glass of water 3. Add nothing to the third glass of water 4. Add to each of the three glasses 1 tsp active dry yeast 5. Observe the reaction of the yeast to the solution over a ten minute period 6. Evaluate which glass provided the best environment for yeast growth Lecture from Teacher Information Sheet. Review vocabulary words.

III. Application:

Have students complete Skill Builders individually or in groups.

IV. Evaluation

TEST - YEAST LEAVENING

True or False

1.______ Yeast is the leavening agent for bread dough.

2.______ Yeast produces bubbles of carbon dioxide gas which stretch the elastic-like dough, causing it to rise.

3.______ Yeast is a living plant which grows when mixed with liquid and sugar.

4.______ The dough for refrigerator rolls can be stored in the refrigerator until ready to shape.

5.______ For yeast to grow properly, it is important that the liquid be the correct temperature. Active dry yeast works best in water at 212°F.

6.______ Sugar provides food for yeast to grow.

7.______ Salt adds flavor and prevents yeast from growing too rapidly in yeast bread.

8.______ While rising, yeast dough should be kept in a warm place away from drafts.

9.______ After a loaf of bread is shaped, it is allowed to rise again before baking.

10.____ Kneading is a process in which dough is worked with the hands on a board until it looks smooth and satiny and has little bubbles of carbon dioxide showing under the surface.

ASSIGNMENT SHEET

Science Concept: Leavening - Biological

Task: Leaven with Yeast

Why learn this?

Leavening processes are varied. Each process, whether physical, chemical, or bacterial, produces different results. All leavening, however, relies on producing gases or vapors in the batter or dough, allowing those gases to expand, and then setting the shape of the product through heat to provide a permanent cell-like structure. Leavening produces products that are light, airy, fine-textured, and palatable. When you know about leavening processes and why one is chosen over the others for a particular product, you can control the leavening reactions and the finished results. When products do not turn out the way they should, you can analyze them and determine the problem. Knowledge will help you avoid making the same mistake twice.

Principle Emphasized:

Yeast ferments sugar to form carbon dioxide gas and alcohol. The expanding gas gives flour products an airy texture when set by heat.

$$\underset{\text{(sugar)}}{C_6H_{12}O_6} + \text{Yeast} - \underset{\text{(carbon dioxide)}}{2CO_2} + \underset{\text{(alcohol)}}{2C_2H_5OH}$$

Words to Know:

Carbohydrates
Enzymes
Ferment
Knead
Proof

Resources: Information Sheet - Leavening with Yeast

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1. Read the resources
2. Complete Skill Builder - Words to Know
3. Complete Skill Builder - Proofing

INFORMATION SHEET

LEAVENING WITH YEAST

Yeast is a living one-celled plant that feeds on sugar and produces carbon dioxide gas (CO_2). This gas forms bubbles inside the yeast dough, expands it,and leavens the finished product. Because yeast is a living organism, it must be treated to the kind of environment that it likes. Four conditions encourage the best yeast growth; they include warmth, moisture, food, and time.

Warmth

The most suitable temperature for yeast growth is body temperature, 98.6°F. The temperature range for yeast development is:

60-70°F	Slow growth
80°F	Normal growth
90-100°F	Fast growth
140°F	Yeast is killed

Moisture

The moisture to support yeast growth should be neutral water. Yeast is sensitive to both acid and alkaline conditions and does not grow well in either. Do not use milk, which is mildly acid, to start the initial yeast growth.

Food

The favorite food of yeast is sugar. Yeast activity increases when sugar is provided. Salt, however, will slow the growth of yeast.

Time

Yeast takes a long time to ferment and produce enough bubbles to leaven a heavy dough. It is important to give time for the yeast to produce the right amount of leavening in the product.

The process for making a product leavened by yeast includes the following steps:

1. Dissolve the yeast in warm water (body temperature) for five minutes.
2. Add the yeast to the other dough ingredients according to the directions of the recipe.
3. Knead the dough to develop the flour protein structure.
4. Proof the dough in a warm, moist place until it doubles in bulk.
5. Punch down the dough removing all the CO_2 gas from it.
6. Shape the dough into the desired loaves or rolls.
7. Allow the rolls or loaves to proof again until double in volume.

8. Bake the product in a hot oven to kill the yeast, to stop the leavening action, and to set the shape.

Proofing means to provide ideal conditions for yeast growth. Commercial proof cabinets are available to control temperature and provide a humid environment. Dough is punched down and allowed to rise again to give the yeast more contact with the available food source so that it can double its efforts and produce twice as many bubbles. The first proof produces large, weak bubbles. The second proof provides an increased number of smaller, stronger bubbles which give the dough a finer grain and texture. Some yeast can withstand a third proof, but usually the yeast organism is no longer strong enough to rebuild the dough structure.

When the yeast rolls or loaves are put in the oven to bake, you will notice "oven spring." This is when the heat of the oven briefly accelerates the yeast growth before killing it at 140°F.

SKILL BUILDER

WORDS TO KNOW

Directions:

Define the following words in the spaces provided.

1. Carbohydrates______________________________

____

2. Enzymes______________________________

____

3. Ferment ______________________________

____

4. Knead______________________________

____

5. Proof______________________________

____

SKILL BUILDER

PROOFING

Most yeast doughs need two proofs for proper texture and volume. In this experiment you will see the texture of baked products that have been proofed one, two, three, and four times. Yeast, as it ferments and grows, eventually sours and dies.

Yeast Dough

1 cup milk
1/2 cup sugar
2 tsp salt
1/4 cup shortening
1/2 cup warm water
1 package active yeast
2 eggs
5 cups sifted flour

Heat milk to scalding. Measure sugar, salt, and shortening into large mixing bowl. Pour hot milk into bowl. Set aside to cool to lukewarm. Add yeast to warm water. Add 2 cups of flour to the warm milk and stir until smooth. Pour yeast mixture into batter, add eggs and beat. Add 2 cups of flour and stir. Knead in the remaining 1 cup of flour.

Experiment 1

1. Divide the dough into five equal parts using the baker scales to check accuracy.
2. First proof: Place three of the parts in the proof cabinet for the first proof. Shape the fourth part into 2 ounce rolls and place these in the proof box for the first proof. Bake the rolls after the first proof and label them.
3. Second proof: Punch down the three remaining parts after they have completed the first proof. Shape one part into 2 ounce rolls. Return all three parts to the proof cabinet for a second proof. Bake and label the rolls after they have completed the second proof.
4. Third proof: Punch down the remaining parts of dough after they have completed the second proof. Shape one part into 2 ounce rolls. Return both parts to the proof cabinet for the third proof. Bake the rolls and label them.
5. Fourth proof: Punch down the last part of the dough; shape it into 2 ounce rolls. Proof the rolls; bake and label them after they have completed the fourth proofing.
6. Use the fifth portion of dough for experiment 2.
7. When all rolls are cool, cut them open with a bread knife. Using the chart that follows, compare the rolls in flavor, texture, volume, and smell.

Probable Results of Proofing

First Proof:	Large, Course Texture
Second Proof:	Finer Texture, Good Volume
Third Proof:	Very Fine Texture, Low Volume, Heavy, Vinegar Odor
Fourth Proof:	Very Fine Texture, Very Low Volume, Vinegar Taste and Odor

Experiment 2

The proof cabinet is used to control and provide the perfect environment of warmth and humidity so as to generate the greatest leavening action in the least amount of time. Yeast will leaven at any temperature between 35° and 140°F. Cooler temperatures only slow the reaction. Dough can be mixed and placed in the refrigerator over night,and it will double in bulk so that it can be punched down, shaped, and proofed the next day. The second proof can also take place in the refrigerator. Maximum refrigeration storage each time is 24 hours. Dough or shaped rolls can also be frozen to stop all yeast action. Freezing does not kill the yeast; it suspends it. In this experiment, you will be able to evaluate and compare yeast leaven products proofed under refrigeration.

1. Place dough in the refrigerator until double in bulk. Punch down and shape the dough into 2 ounce rolls.
2. Put the dough in the refrigerator to leaven.
3. After the dough has doubled in bulk, punch down and shape it into 2 ounce rolls.
4. Proof the rolls in the refrigerator again until double in bulk.
5. Bake the rolls, cool, and cut them with a bread knife.
6. Compare the texture, volume, taste, and smell of the rolls proofed in the refrigerator with rolls proofed in a proof cabinet. Chart the results.

Proofing	Flavor	Texture	Volume	Smell
1				
2				
3				
4				
Refrigerator Proofed				

a bird's eye view

MAINTAINING SANITARY CONDITIONS DURING RECEIVING AND STORING OF FOOD

Understand this science concept:

Microorganisms need food, warmth , and moisture to grow.

Teacher Materials
Information Sheet
Sample Lesson Plan

Student Materials

Assignment Sheet:	Sanitation - Bacterial Growth
Information Sheets:	Food Inspection During Purchasing and Receiving Proper Storage to Prevent Food Spoilage
Skill Builders:	Words to Know Signs of Food Spoilage Quality Checklist for Receiving Food and Supplies Correct Food Storage Practices Food Inspection at Receiving

TEACHER INFORMATION SHEET

Understand this science concept:

Microorganisms need food, warmth, and moisture to grow.

Bacteria and Food Spoilage

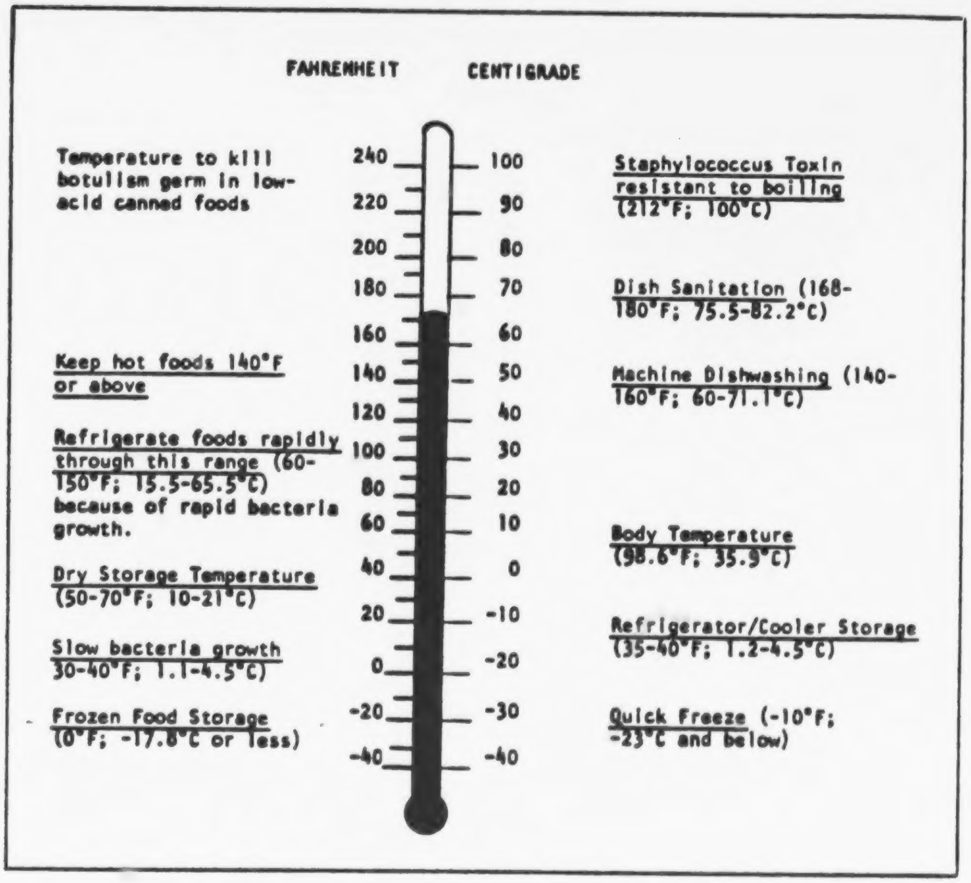
Food contamination which causes illness can occur when:

Foods are not properly prepared
Foods are not properly stored
Personal hygiene practices are inadequate
Equipment is not clean

One major type of contamination is bacteria. Bacteria are small, one-cell organisms that grow in a variety of foods. They can give off toxins that are poisonous, and that can contaminate foods without noticeably changing taste, smell, and appearance. Three conditions that influence the growth of bacteria are food, warmth, and moisture.

Conditions of Bacterial Growth

Temperature. Under conditions of warmth, food, and moisture, bacteria grow very rapidly regardless of type. They double their number every 20 minutes. Since some bacteria and moisture are present in all foods, it is very important to control the temperatures that produce bacteria most rapidly. The thermometer shows the most dangerous temperature zone to be 60-150°F. (15.5-65.5°C.)


FAHRENHEIT
CENTIGRADE
Temperature to kill botulism germ in low-acid canned foods
Keep hot foods 140°F or above
Refrigerate foods rapidly through this range (60-150°F; 15.5-65.5°C) because of rapid bacteria growth.
Dry Storage Temperature (50-70°F; 10-21°C)
Slow bacteria growth 30-40°F; 1.1-4.5°C)
Frozen Food Storage (0°F; -17.8°C or less)
240
220
200
180
160
140
120
100
80
60
40
20
0
-20
-40
100
90
80
70
60
50
40
30
20
10
0
-10
-20
-30
-40
Staphylococcus Toxin resistant to boiling (212°F; 100°C)
Dish Sanitation (168-180°F; 75.5-82.2°C)
Machine Dishwashing (140-160°F; 60-71.1°C)
Body Temperature (98.6°F; 35.9°C)
Refrigerator/Cooler Storage (35-40°F; 1.2-4.5°C)
Quick Freeze (-10°F; -23°C and below)

A few species of bacteria can survive extremes of hot and cold. Some will be killed at 110°F; most will be killed at 130°F. However, some species can survive boiling temperatures. For this reason, most canned foods must be preserved by pressure canners at temperatures above 212°F. There are a few species that grow at temperatures between 32-45°F.

Cold temperatures retard most bacterial growth. Refrigeration temperatures, which usually range between 34°-45°F, slow down food spoilage for short periods of time. Freezing stops bacterial growth and foods can be preserved at freezing temperatures for long periods of time. Freezing does not kill bacteria and once frozen foods are returned to warmer temperatures, bacterial growth resumes.

Moisture. Since bacteria need moisture to grow, it is important to keep dry foods free from moisture. If food products such as sugar and flour are kept dry, they can be stored safely even though bacteria are present. Dried fruits and meats are good examples of foods that spoil quickly if moisture is present.

Food. Most bacteria require oxygen for growth, but a few will grow in oxygen-free surroundings. Bacteria grow most rapidly in an environment that is neutral or slightly acidic. A few will survive in a medium of high acid or salt content. Certain strains of bacteria are highly selective. For example, they may live very well on meat, but not on vegetables.

SAMPLE LESSON PLAN

Science Concept: Sanitation - Bacterial Growth
Task: Maintaining Sanitary Conditions During Receiving and Storing of Food

Objective: The student will be able to:

1. Explain how to control growth of microorganisms while storing and handling food.
2. Receive, store, and handle food under sanitary conditions.

Teaching Aids:

7 Slices of Bread
Toaster
Display of Spoiled Foods

I. Preparation of the Learner:

Have students compute how many bacteria would be present at 4:00 p.m. if only one bacterium was present at 12:00 noon. Bacteria double every 20 minutes.

II. Presentation:

CONCEPT	CLASSROOM ACTIVITY
Microorganisms need food, warmth, and moisture to grow	Lecture from Teacher Information Sheet. Experiment: Show common mold growth by moistening a slice of bread and exposing it to classroom air. Keep it at room temperature for three or four days. Mold will develop from mold spores which have settled from the air. Experiment: To show moisture conditions under which mold develops most rapidly, prepare three slices of bread according to the following directions. Keep all three samples at room temperature. 1. Toast a piece of bread until it becomes very dry. 2. Place the second slice of bread on a plate and keep it fairly moist (but not soaked).

II. Presentation:

CONCEPT	CLASSROOM ACTIVITY
	3. Immerse the third slice in water.
	To show temperature conditions which promote mold growth, prepare and store three more slices of bread as follows.
	4. Moisten a slice of bread and store at refrigeration temperatures.
	5. Moisten a second slice and keep it at room temperature.
	6. Moisten a third slice and keep it at a relatively hot temperature.
	The second and fifth slices of bread should show the most mold growth indicating mold grows best at warm temperatures under slightly moist conditions.
	Review vocabulary words.

III. Application:

Have students complete Skill Builders on the assignment sheet individually or in groups.

IV. Evaluation:

TEST - BACTERIAL GROWTH

True or False

1._____Freezing kills bacteria.

2._____Bacteria gives off waste.

3._____Bacteria grow most rapidly between 110°F and 130°F.

4._____Dried fruit does not spoil because bacteria needs moisture to grow.

5._____Foods held at serving temperatures should be between 60°F-110°F to prevent bacterial growth.

6._____All bacteria is destroyed by temperatures of boiling water.

7._____Machine dishwashing should use water temperatures of 90°F-110°F.

ASSIGNMENT SHEET

Science Concept: Sanitation - Bacterial Growth

Task: Maintaining Sanitary Conditions During Receiving and Storing of Food

Why learn this?

As a food service worker, one must control factors that cause contamination as foodstuffs and supplies enter the food service establishment. All foods should be fresh and uncontaminated upon arrival and remain that way until used. It is the responsibility of each worker to oversee the handling and management of foods and supplies.

Principle Emphasized:

> Microorganisms need food, warmth, and moisture to grow.

Words to Know:

Botulism
Coloration
Contamination
Microorganism
Mold
Pasteurize
Produce
Puncture
Purveyor
Quality
Quantity
Specifications
Standards
Staples
Toxin
Verification

Resources: Information Sheets - Food Inspection During Purchasing and Receiving
Proper Storage to Prevent Food Spoilage

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1. Read the resources
2. Complete Skill Builder - Words to Know
3. Complete Skill Builder - Signs of Food Spoilage
4. Complete Skill Builder - Quality Checklist for Receiving Food and Supplies
5. Complete Skill Builder - Correct Food Storage Practices
6. Complete Skill Builder - Food Inspection at Receiving

INFORMATION SHEET

FOOD INSPECTION

DURING PURCHASING AND RECEIVING

Establishing planning and purchasing standards and receiving procedures is essential to maintaining high quality food service. A plan for purchasing includes developing a list of items with specifications and quantities. Purchasing based on this preliminary planning results in obtaining quality food for customers. Receiving is the actual delivery of food and supplies to the kitchen, receiving dock, or storage area and should include inspection and verification of foods and supplies according to specification and quantities. Standards or guidelines must be set and followed in order to prevent entry of harmful insects, rodents, filth, and microorganisms. Such standards include:

1. Choosing a reputable purveyor for purchasing foods and supplies.
2. Scheduling deliveries when foods and supplies can be inspected by a person who knows the standards for purchasing.
3. Purchasing foods and supplies according to quantities needed at a specific time depending on available storage space.
4. Identifying specifications and standards of quality for each item purchased.

   a. Frozen foods. Must be solidly frozen with no evidence of defrosting or refreezing, be free from discoloration, softness or frost on the package.

   b. Produce. Must show evidence of freshness by being firm, crisp. and without bruises, mold, rotten spots, or cuts.

   c. Meats. Must have been inspected by the U.S. Department of Agriculture and have received the inspection Stamp. Quality meat is dry, firm, normal color for the type of animal, and free from spoiled odor.

	COLOR	APPEARANCE OR TEXTURE
Beef	Bright Red	Firm, not slimy or soft
Veal	Pinkish Brown	
Lamb	Dark Pink	
Pork	Light Pink	No greenish brown color where meat and bone meet
Fish	Bright Red Gills	Clear eyes; firm-textured flesh
Poultry	Light Coloration	No darkening of wings and ends of legs

d. Dairy Products.

   1. Cheese. Should be free from holes or tears in the containers or wrappings which cause hardening of the cheese; should be no evidence of mold.

   2. Milk. Should be pasteurized, grade A, with no leakage of containers.

e. Eggs. Should be grade A, clean, with unbroken shells.

f. Canned Food. Containers should be free from dents, bulges, leaks; cans should have labels; home-canned foods should not be used because of risk of possible botulism toxin.

g. Staple Items. Should be checked for punctures, tears, or holes in bags, boxes, or other containers and must be free from moisture.

   1. Sugar. Both brown and white sugar must be soft and free of lumps.

5. Identifying a worker to be in charge of receiving each time delivery is made.

The food service workers in charge of purchasing and receiving must be detectives on guard who protect the health of both patron and co-workers. They serve as the first line of defense by being alert to the dangers of contamination through delivery of supplies and foods.

INFORMATION SHEET

PROPER STORAGE
TO PREVENT FOOD SPOILAGE

In order to protect customer and employee health, foods and supplies must be stored properly to prevent contamination and spoilage. Food service storage facilities consist of:

1. Dry food storage
2. Nonfood supply storage
3. Refrigerated storage
4. Freezer storage

These areas function to keep foods and supplies in good condition until they are needed and to prevent contamination, spoilage, or infestation. Areas within these four facilities that need frequent inspection are:

1. Walls, Floors and Ceilings. Should be smooth, free of cracks and chips, and moisture proof. They need regular cleaning with particular attention to corners and areas around and under shelves.
2. Shelves. Should be at least 12 inches off the floor to prevent rats, mice, and insects from reaching the shelves easily. Shelving should also be kept away from walls to prevent hiding places for rodents and should be uncovered so air can circulate freely.
3. Doors and Windows. Should be equipped with screens with tight frames to prevent entry of insects, rodents, and moisture. Must be covered to prevent sunlight from deteriorating foodstuffs.

Dry Storage Regulations

1. Check for infestation of incoming supplies.
2. Store foods not requiring refrigeration or freezing in a clean, well-lighted, well-ventilated area, temperature 10-21°C or 50-70°F, to prevent deterioration. Insects may infest cereals and flour, and canned goods may swell if the temperature is too warm.
3. Remove food from shipping cases and boxes, when possible, but keep food covered. Dispose of empty containers.
4. Bagged items, such as potatoes and onions, must be cross-stacked for good ventilation. Flour and sugar should be stored in bins that are easily moved.
5. Store seldom used items on top shelves and heavy items on bottom shelves, depending on frequency of use. Grain products should be stored near bottom shelf for frequent inspection and to prevent infestation of insects.
6. Store foods on shelves using the FIFO system (first-in, first-out).

7. Store nothing on the floor.

8. Store foods with the label facing the front of the shelves.

9. Store like items together, such as all canned items, separated by type; all paper items; all seasonings, spices,and flavorings; all bakery items; all plastic or glass containers.

10. Label shelves alphabetically according to the contents so items can be easily located.

11. Report any cans that budge, are rusting, show signs of leakage,or are dented; report all torn or punctured boxes, containers,or bags to the teacher/manager.

12. Store cleaning supplies separate from foods: do not combine them with food dry storage.

13. Notify teacher/manager if any sign of rodents or insects appears in the storage areas.

14. Keep chemical controls away from foods; follow manufacturer's directions for use.

COMMON PESTS AND THEIR HOMES

Where conditions are right, certain pests can usually be found. The most common types and their homes are given below.

1. Flies - Rotting fruits and vegetables, garbage can receptacles and areas.

2. Cockroaches - Standing water around pipe drains and in dark areas where crumbs of food collect.

3. Ants - Sweet foods and liquids, spills of meat or oily foods.

4. Rodents - Decaying foods: around garbage, waste containers, and rubbish piles, particularly when extra care is not taken to keep the area clean and picked up.

5. Mosquitoes - Around drains and where standing or polluted water is available.

6. Silverfish - Moist places such as drains, sinks, and dishwashers where starchy food is present.

Methods of pest control that eliminate sources of entry and places to reproduce include:

1. Removing or throwing away spoiled fruits and vegetables from kitchen or storage areas as soon as detected.

2. Removing standing water from sinks, floors, and countertops.

3. Keeping the daily condition of countertops, floors, and equipment spotless.

4. Keeping lids on garbage containers and disposing of garbage waste daily.

5. Cleaning all drains and garbage disposers daily.

6. Keeping doors and windows closed and screened.

7. Reporting all structural problems needing repair to the teacher/manager as soon as possible.

Nonfood Storage Regulations

1. Check for infestation of incoming supplies.

2. Store nonfoods in separate room from food supplies and foodstuffs. Examples: poisons, toxic agents, bactericides, lime products, soaps, stainless steel cleaners, and any other cleaning supplies and equipment such as brooms, mops, and brushes.

3. Use nonfood items carefully and in accordance with manufacturer's directions.

4. Use nonfood items when preparation and serving areas are not in use since contamination could otherwise take place.

5. Only use chemicals with approval of teacher/manager.

6. Keep nonfood items labeled correctly and tightly sealed.

Refrigerator-Cooler Storage Regulations

1. Check for infestation of incoming foods before storing.

2. Perishable foods received must be stored immediately in covered containers because refrigeration helps preserve color, flavor, and texture of items and helps reduce spoilage.

3. Keep food on shelves or racks provided and never on the floor. Store like items together.

4. Leave 4" for air circulation between pans that contain cooked foods. Do not overload refrigerators or cooler since too many items tend to raise temperature. The refrigerator/cooler must have a ventilation system to prevent an accumulation of stale air.

5. Check temperatures of refrigerators or coolers daily to see if operating correctly. A thermometer should be placed in the warmest area of the refrigerator. They should be approximately 5°C or 40°F.

6. Use FIFO system (first-in, first-out) of storage.

7. Refrigerators and coolers must be kept clean and free from mold and objectionable odors by using baking soda or charcoal in an open container.

8. Clean all refrigerators and coolers weekly. When something is spilled, it must be cleaned up immediately.

9. Check for spoiled foods and discard immediately. Signs for chemical changes in food caused by microorganisms are as follows.

    a. Canned Food - Off color and odor, contains milky liquid or juice, and foam.

b. Fresh Fruits and Vegetables - Rotten areas, mold, off odor, chemical sprays leave gray-like film which can be washed.

c. Leftover Foods - Off odor and color, mold.

d. Eggs - Off color where contents go together as one and does not separate, sulfur-like odor.

e. Frozen Foods - Off color and odor, bacteria are only dormant prior to thawing.

f. Milk and Milk Products - Off odor and color, mold sometimes is present. Mold on cheese can be trimmed.

g. Meats

1. Beef.- Off odor, slimy to touch, soft, spoils along surface first, dark brownish-red color.
2. Pork - Spoils at meeting place of bone and flesh, greenish-brown color.
3. Poultry - Stickiness around joints, off odor, darkening of small areas such as wing tips, legs.
4. Fish - Unusual odor, flesh pulls away easily from bones, retains fingerprint when touched, limp instead of rigid flesh.

10. Avoid excessive traffic in and out of refrigerators and coolers.

11. Store raw meats or thawing foods in separate area or on bottom shelf.

12. Store raw foods below prepared or ready-to-eat foods; since warm air rises, warm foods below could cause spoilage in raw foods.

13. Hazardous foods that could cause food poisoning such as custards, puddings, milk and milk products, eggs, meats, fish, poultry, stuffings, sauces, gravies, and salads must be kept below 5°C or 40°F. Thick hot foods such as sauces and gravies should be stored in 4" shallow pans for rapid cooling.

14. Label, date, and cover all cooked foods and other foods put into containers such as egg yolks, egg whites, salad dressings, etc.

15. Store leftover foods in refrigerator or cooler for no more than 24 hours because of spoilage possibilities. If needed to be stored longer than this, put in freezer.

16. Immediately refrigerate all cooked foods at a temperature of 50°C or 40°F (or less in shallow containers).

17. Temperature controlled storage for refrigerators and coolers is as follows.

a. Meats must be stored at 1.2°C or 35°F; therefore, store on bottom shelf farthest from door since this shelf is coldest. Meats should be kept in refrigerator/cooler no longer than 2 days.

b. Dairy products must be kept at 1.6°C or 35°F. This would require a middle shelf. Egg shells, cheese, milk, and cream absorb odors and should be stored away from foods having strong odors such as onions and cabbage. Cheese needs to be tightly wrapped so it doesn't dry out or spread its odor throughout the unit.

c. Fruits and vegetables other than bananas should be stored at 4°C or 40°F, or near top shelf since it is the warmest.

d. Vegetables needing moisture, such as lettuce and other leafy greens, celery, and carrots must be kept where they will be crisp whether stored in plastic bags or containers.

e. Vegetables and fruits needing dryness such as citrus fruits, strawberries,and tomatoes should be kept cool but away from any moisture in refrigerators or coolers.

Frozen Food Storage Regulations

1. Frozen foods must be kept at -18°C or 0°F or lower. Check daily to see that freezers are operating at this temperature and be certain thermometer is accurate.
2. Use FIFO system (first-in, first-out) of storage on all shelves.
3. Frozen foods should be quickly moved from delivery to freezer to prevent any defrosting or thawing.
4. Frozen foods will only be as fresh as they were when placed in freezer.
5. Keep traffic in and out of a freezer to a minimum. Keep foods on shelves or racks and off the floor. Be certain there is enough space around frozen foods for air circulation. Do not overload the shelves.
6. Label, date and cover tightly all frozen food packages and containers to prevent any air from entering to cause deterioration and contamination.
7. Thaw frozen foods in refrigerator or cooler under clean running lukewarm water or cook directly in the frozen state.
8. Use thawed food immediately. Thawing and refreezing of frozen foods must be avoided because of spoilage, loss of flavor,and nutritive value.

   a. Freezing foods only makes bacteria dormant. Thawing and refreezing doubles the bacteria count each time. Therefore, do not use refrozen food unless it was cooked between the two freezings.

9. Cabinet walls or coils of a freezer may need defrosting and drainage pans may need to be emptied.
10. Storage time for frozen foods is as follows.

    a. Meats, poultry, fish,and seafood - 3 to 4 months

    b. Vegetables and fruits - 2 to 3 months

    c. Breads - 9 to 12 months

    d. Cakes - 2 to 3 months

    e. Pies - 4 to 6 months

    f. Creamed dishes, stews,and sauces - 3 to 4 months

Only through proper use and control of storage facilities, including dry storeroom, nonfood supply storeroom, refrigerators and/or coolers and freezers can we cut down waste and the dangers to our customers from possible food-borne illness.

SKILL BUILDER

WORDS TO KNOW

Directions:

Match the correct definition with each word by putting the letter in the blank.

_____1. Contamination
_____2. Specifications
_____3. Quantities
_____4. Quality
_____5. Verification
_____6. Standards
_____7. Microorganisms
_____8. Reputable
_____9. Purveyor
_____10. Produce
_____11. Mold
_____12. Coloration
_____13. Pasteurize
_____14. Botulism
_____15. Toxin
_____16. Staples
_____17. Puncture

a. Degree of excellence
b. Guidelines set for foodstuffs
c. Fresh fruits and vegetables
d. Itemized list of requirements for foods to be purchased.
e. To sterilize by heating at 131-158°F for 30 minutes.
f. Of good quality
g. Type of food poison, usually fatal, caused by toxin in canned meats and vegetables, particularly home-canned products.
h. To make food impure by undesirable microorganisms.
i. Microscopic plants (fungi) that appear as fuzzy patches on food
j. Poison produced in living plants and animals
k. Amount to be purchased
l. Standard and essential--such as flour, sugar, salt, spices, etc.
m. To examine to be true as ordered
n. Person or company who supplies food
o. Hole made by a sharp object
p. Pigment in foods
q. An organism that can only be seen through a microscope

SKILL BUILDER

SIGNS OF FOOD SPOILAGE

Directions:

Inspect foods in the food service establishment. Identify any sign of spoilage that has started indicating that the following foods should not be eaten.

1. Meats (raw, cooked, canned, and frozen) ____________________

____

____

2. Fruits (fresh, canned but leftover, frozen) ____________________

____

____

3. Vegetables (fresh, canned, leftover, frozen) ____________________

____

____

4. Bakery Products (rolls, bread, fruit and custard pie, cake) __________

____

____

5. Milk and Milk Products ____________________

____

____

6. Cheese ____________________

____

____

7. Flour and Cereal ____________________

____

____

SKILL BUILDER

QUALITY CHECKLIST FOR RECEIVING FOOD AND SUPPLIES

Directions:

After receiving the next delivery of food and supplies, select and inspect at least four items representing four groups of foods. Rate their quality as identified in the information sheet "Maintaining Sanitary Conditions During Purchasing and Receiving." After examining each item, complete the chart, describing quality characteristics of the product.

TYPE	ITEM TO BE INSPECTED	DESCRIBE QUALITY CHARACTERISTICS	GOOD	* FAIR	* POOR
Frozen Food					
Fresh Produce					
Canned Foods					
Meat/Fish/ Poultry					
Eggs					
Dairy Foods					
Staples					

* Indicates level of quality that should not be accepted by the receiving worker.

SKILL BUILDER

CORRECT FOOD STORAGE PRACTICES

Directions:

Complete the chart showing how to store the following foods correctly. Include the type of storage, temperature, shelf location, and length of storage.

FOOD ITEM	TYPE OF STORAGE	TEMPERATURE AND SHELF LOCATION	LENGTH OF STORAGE
Poultry			
Flour			
Ice Cream			
Canned Fruits			
Lettuce			
Dried Fruits			
Graham Crackers			
Frozen Orange Juice			
Butter/ Margarine			
Honey			
Cheese			
Hot Dogs			
Beef Roast			
Potatoes			
Plastic Wrap			
Insecticides			
Jello Salad			
Chicken a la King			
Flavorings			
Cereals			
Cleaning Supplies			

SKILL BUILDER

FOOD INSPECTION AT RECEIVING

Using the inspection checklist for food service operators, evaluate the storage facilities and comment on what you find. Self-inspection sheets are included for this activity.

Directions:

Answer each question by inspecting this part of your food service operation and placing a check in the "yes" column if done satisfactority, and a check in the "no" column if not. Write your comments about the problems noted and the action needed to correct them in the space provided.

Raw Food and Ingredients: Receiving Point

Date Reviewed: ____________

By: ____________

ITEM	YES	NO	COMMENTS ON PROBLEMS AND STEPS REQUIRED	DATE CORRECTED
Food: Inspected immediately upon receipt for spoilage or infestation?				
Perishable food: Moved promptly to refrigeration?				
Unattended perishable food: Deliveries left on loading dock or dolly?				
Nonfood supplies: Checked for infestation?				
Empty shipping containers and packing: Removed to disposal area promptly?				
Floor or receiving area: Clean?				
Receiving area: Free of food particles and debris?				

Directions:

Answer each question by inspecting this part of your food service operation and placing a check in the "yes" column if done satisfactorily, and a check in the "no" column if not. Write your comments about the problems noted and the action needed to correct them in the space provided.

Storage Rooms for Supplies and Equipment

Date Reviewed: ____________

By: ____________

ITEM	YES	NO	COMMENTS ON PROBLEMS AND STEPS REQUIRED	DATE CORRECTED
Storage facilities for supplies and equipment: Clean, dry, and free of trash and debris?				
Storage facilities: Free of empty cartons and wrappings which might provide nesting for rodents?				
Supplies: Stored in a neat and orderly manner?				
Supplies: Stored off the floor and away from walls to permit access for cleaning and to prevent harborage of rodents and roaches?				
Perishable or unpackaged food: Present?				
Containers of pesticides: Marked cabinet present; containers properly stored?				
Rodents or insects: Evidence of presence?				

Directions:

Answer each question by inspecting this part of your food service operation and placing a check in the "yes" column if done satisfactorily, and a check in the "no" column if not. Write your comments about the problems noted and the action needed to correct them in the space provided.

Dry Stores

Date Reviewed:____________

By:________________

ITEM	YES	NO	COMMENTS ON PROBLEMS AND STEPS REQUIRED	DATE CORRECTED
Food: Stored off the floor on shelves, racks, or platforms?				
Floor: Clean and free from spilled food?				
Shelves: High enough off floor to permit cleaning underneath, or is area beneath shelf enclosed and accumulating soil?				
Shelves: Away from wall to permit ventilation and discourage nesting of insects and rodents?				
Empty cartons and trash: Have they been removed?				
Canned goods: Removed from cartons for shelving to maximum extent practicable?				
Food storage shelves: Clean and free of dust and debris?				
Food supplies: Stored in a manner to insure "first-in, first-out" use?				
Storeroom: Dry--free from dampness?				

Dry Stores - Continued

ITEM	YES	NO	COMMENTS ON PROBLEMS AND STEPS REQUIRED	DATE CORRECTED
Nonfood supplies: Stored separately from food stock?				
Toxic materials (including pesticides): Conspicuously labeled and used from original containers only?				
Pesticides: Separately stored in a well marked cabinet?				
Insects and rodents: Evidence of presence?				
Insecticides or rodenticides: Evidence of misuse or spillage?				

Directions:

Answer each question by inspecting this part of your food service operation and placing a check in the "yes" column if done satisfactorily, and a check in the "no" column if not. Write your comments about the problems noted and the action needed to correct them in the space provided.

Refrigerator Storage

Date Reviewed: ______________

By: ________________________

ITEM	YES	NO	COMMENTS ON PROBLEMS AND STEPS REQUIRED	DATE CORRECTED
Refrigerators: Are all operating?				
Refrigerators: Equipped with accurate thermometers?				
Refrigerators: Maintaining potentially hazardous foods at temperatures of 45°F or lower?				
Refrigerators: Clean and free from mold and objectionable odors?				
Food: Being stored off the floor of walk-in refrigerators?				
Foods stored on shelves: Spaced to provide for adequate air circulation?				
Panned raw or cooked foods: On shelves, covered to prevent contamination?				
Cooked foods such as ground meat, stew, dressing, or gravy: Not stored in large quantity containers?				
Foods: Stored in a manner to permit "first-in, first-out" use?				

Refrigerator Storage - Continued

ITEM	YES	NO	COMMENTS ON PROBLEMS AND STEPS REQUIRED	DATE CORRECTED
Spoiled foods: Any present?				
Raw foods: Stored separately from cooked foods?				
Shelves: High enough from the floor to permit underneath cleaning?				
Shelves: Free from food husks, leaves, wrappings, or debris?				
Refrigerators: Is traffic in and out of walk-in refrigerators excessive?				
Refrigerators: Any overloaded?				

Directions:

Answer each question by inspecting this part of your food service operation and placing a check in the "yes" column if done satisfactorily, and a check in the "no" column if not. Write your comments about the problems noted and the action needed to correct them in the space provided.

Freezer Storage

Date Reviewed:______________

By:________________________

ITEM	YES	NO	COMMENTS ON PROBLEMS AND STEPS REQUIRED	DATE CORRECTED
Freezer storage units: Operating?				
Boxes or cabinets: Have accurate thermometers?				
Freezer storage units: Maintaining an interior temperature of 0°F or lower?				
Walk-in freezer storage boxes: Excessive in and out traffic?				
Food: Stored in a manner which permits "first-in, first-out" use?				
Food: Stored in a manner to insure air circulation?				
Cabinet walls or coils: Need defrosting?				

a bird's eye view

MAINTAINING SANITARY CONDITIONS IN THE DINING AREA

Understand this science concept:

Bacterial, viral, and parasitic infections can pass from person to person through contaminated foods infected by humans or animals.

Teacher Materials

Information Sheet

Sample Lesson Plan

Student Materials

Assignment Sheet:	Maintain Sanitary Conditions in the Dining Area
Information Sheets:	Personal Hygiene for a Food Service Worker
	Promoting Sanitation through Good Dining Room Service
Skill Builders:	Words to Know
	Personal Care Chart
	What Kind of Dining Room Employee Are You?
	Sanitation in the Dining Room

TEACHER INFORMATION SHEET

Understand this science concept:

Bacterial, viral, and parasitic infections can pass from person to person through contaminated foods infected by humans or animals.

Microorganisms have no means of moving from place to place so they depend on other sources such as humans, rodents, water, food, wind, and insects for transportation.

Humans

Humans are a common source of food contamination spreading bacteria in many ways -- by the hands, by breathing, with perspiration , with a cough or a sneeze. For this reason, food service managers must hire employees who are:

1. In good health
2. Have clean personal habits
3. Handle food safely

Rodents and Insects

Rodents and insects pose another threat to health through contamination. Mice and rats are particularly notorious as disease carriers. They carry disease-producing germs on their feet, in their fur, and in their intestinal tract. They love to roam and feed in garbage dumps and sewers. Presence of their droppings is a sure sign that steps must be taken to protect foods and eliminate the rodents. Flies and cockroaches are common pests in food service establishments. They contaminate the food with their mouth parts, feet, and droppings and must be eliminated to maintain health and sanitation.

Contaminating Food

Studies indicate that more than half of the general public carries highly toxic strains of staphylococci. It is estimated that 50% of all food handlers are bearers of disease agents which can be transmitted by food. Colonies of staphylococci can be present even on a healthy person. They can be on the skin and hair or in the mouth, throat, and nose. The lower intestinal tract is a common habitat for salmonella and clostrodium perfringen organisms.

When a person becomes ill, the bacterial count increases dramatically and his/her potential as a food contaminator increases. Staph germs are found in abundance around boils, pimples, inflamed cuts, and infected eyes and ears. A sore throat, a cough, sinus pain, and gastrointestinal ailments are all sources of microorganism contamination.

The hands are the most common way contaminants are passed to food from the human body. Picking the nose, rubbing the face, handling the hair, scratching pimple, and couthing without covering the mouth are all ways foods can be contaminated by food service workers.

Hands should always be thoroughly washed after doing any of the following:

1. Contact with infected or unsanitary areas of the body
2. Use of a handkerchief
3. Hand contact with unclean equipment and work surfaces, soiled clothing, wash rags
4. Handling raw foods, particularly meat and poultry
5. Handling money
6. Smoking a cigarette
7. Handling used dishes and utensils

Open cuts and abrasions are a real source of food contamination. They should be antiseptically bandaged with a waterproof protector.

Soiled clothing may be a source of contamination,and a dirty appearance is bad for business. Customers may wonder if the food is as unsanitary as the person handling it. Dirty clothes may be contaminated with disease organisms which can be passed by hands to food.

Applied Food Service Sanitation (where published: National Institute for the Food Service Industry, 1974).

SAMPLE LESSON PLAN

Science Concept: Sanitation - Transmission of Microorganisms
Task: Maintain Sanitary Conditions in the Dining Area

Objective: The student will be able to:

1. Describe practices that promote good personal hygiene
2. Prevent food contamination by developing good personal hygiene habits
3. Describe current sanitation procedures to be followed in setting up, serving, and cleaning the dining area of a food service establishment

Teaching Aids:

Hand Soap
Hot Running Water
Nail File
Scrub Brush

Towels
Dark-Colored Tempera Powder
Table Service

I. Preparation of the Learner:

The most important aspect of personal cleanliness is frequent and thorough hand washing. Body odors may offend and lack of bathing may accelerate bacterial growth, but most often it will be dirty hands that transmit contaminants to food.

II. Presentation:

CONCEPT	CLASSROOM ACTIVITIES
Bacterial, viral, and parasitic infections can pass from person to person through contaminated foods infected by humans or animals	Lecture from Teacher Information Sheet. Role Play: Have students practice setting setting a table for service with dark-colored tempera powder on their hands and fingers. Then have each student serve another all courses of the meal. Where finger marks are left determines the quality of sanitary service provided to the customer. Evaluate the service. Demonstration: To assure properly washed hands, follow these simple steps: 1. Make the temperature of the water as hot as you can stand it. Soap is most effective at temperatures between 110° F and 126° F. 2. Wet the hands and the exposed areas of the wrists and forearms.

II. Presentation: (Cont'd)

CONCEPT

CLASSROOM ACTIVITIES

  - a. Apply soap to palm of one hand; join hands--palm to palm, and work up a soapy lather on hands, wrists, and forearms.
  - b. Interlock fingers; cover all areas between fingers with soap.
  - c. Cup the palm of each hand; force the lather under the nails and scrub with a brush.
  - d. Remove suds and grime from fingernails with a clean nail file.

3. Rinse hands thoroughly under warm-to-hot running water.
4. Again apply soap; lather briskly.
5. Rinse hands, wrists, forearms.
6. Dry hands carefully with individual paper towels or hot air dryer.

Have students practice correct hand-washing procedures. Assign students to work by pairs so that each may evaluate how well the other follows the steps.

Introduce vocabulary words.

Read the information sheets.

III. Application:

Have students complete Skill Builders individually or in groups. Suggested ideas for using these student assignment sheets include:

1. Group students by pairs: have the students in each pair complete a personal hygiene check on each other using the Personal Care Chart. Have students continue to evaluate themselves individually for one week.
2. Have students visit a food service establishment and evaluate a dining room worker.
3. Have a poster contest on sanitation practices in the dining room.

IV. Evaluation:

TEST QUESTIONS

True or False

1. _____ If you are a healthy person, there is little chance for you to contaminate food.

2. _____ Coughing or sneezing can transmit microorganisms to food or food preparation surfaces.

3. _____ Staphylococci are disease-causing microorganisms.

4. _____ During illness the bacterial count decreases.

5. _____ Touching the face or hair can contaminate the food worker's hands.

List seven food handling practices which should always be followed by hand washing to prevent contamination.

6.

7.

8.

9.

10.

11.

12.

ASSIGNMENT SHEET

Science Concept: Sanitation - Transmission of Microorganisms

Task: Maintain Sanitary Conditions in the Dining Area

Why learn this?

In order to protect the customer, it is important that your bodies not contaminate food, and that you practice habits of personal hygiene daily. Dirty people are unsafe in the food industry because they can contaminate foods. They are also a poor advertisement for the establishment.

Principle Emphasized:

Bacterial, viral, and parasitic infections can pass from person to person through contaminated foods infected by humans or animals.

Words to Know:

Agar
Antiperspirant
Bacteria
Bacterium
Boils
Communicable
Contamination
Deodorant
Designated
Diarrhea
Facial
Fumigate
Germicides
Incubate
Infection
Infest
Insecticides
Petri Dish
Probe
Restraint

Resources:

Information Sheet - Personal Hygiene for a Food Service Worker
Information Sheet - Promoting sanitation Through Good Dining Room Service

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1. Read the resources
2. Complete Skill Builder - Words to Know
3. Complete Skill Builder - Personal Care Chart
4. Complete Skill Builder - What Kind of Dining Room Employee Are You?
5. Complete Skill Builder - Sanitation in the Dining Room

INFORMATION SHEET

PERSONAL HYGIENE FOR A FOOD SERVICE WORKER

Appearance

Food service employees can help to prevent contamination of food by habits of personal cleanliness that include:

1. Wearing clean clothing
    a. Uniform
    b. Apron
    c. Underclothing
2. Wearing proper footwear
3. Using hair restraint
4. Wearing a minimum amount of jewelry
5. Bathing daily
6. Practicing facial care
    a. Shaving daily for men
    b. Using moderate makeup for women
7. Controlling body odors by using
    a. Deodorants
    b. Antiperspirants

Personal Habits

A number of personal habits and activities of food service workers can lead to contamination of foods. Some of these habits include:

1. Sneezing
2. Scratching head, face,and nose
3. Smoking in non-designated areas
4. Handling hair
5. Biting fingernails
6. Eating in places not identified for eating
7. Nibbling food on duty

Handwashing

The simple habit of consistently washing one's hands can go a long way to prevent food contamination. Your hands should always be washed using the proper technique. Here are some important times when hands must be washed:

1. Upon reporting for work
2. After use of tissue or handkerchief
3. After eating, drinking,or smoking
4. After handling packaging crates and waste containers
5. After mopping or picking up items from the floor
6. After restroom or locker room use
7. When going from handling raw food products to finished food products
8. After handling money
9. After cleaning restaurant tables

The health of the food service worker is another source of food contamination. All infections and illness should be reported to the teacher/supervisor so that contact with foods can be avoided. Health conditions include:

1. Boils
2. Cuts
3. Sores
4. Rashes
5. Burns
6. Colds
7. Flu
8. Nausea
9. Diarrhea
10. Fever
11. Sore Throats

INFORMATION SHEET

PROMOTING SANITATION THROUGH GOOD DINING ROOM SERVICE

Good Personal Habits for Food Service Worker

The general sanitation procedures given below are good personal habits to form:

1. Uniforms or outer clothing and shoes must be spotless when serving customers. Hands and fingernails must be clean, neat, and trimmed. Teeth and breath should be clean and fresh.
2. Avoid putting fingers and hands on face, nose, skin, or hair as bacteria could be transmitted from these to the foods being served to customers. Whether a requirement or not, this is why one must wear a hair restraint when working in a food service operation. Hair can easily touch or fall into a tray of food to be served. Each time one touches clothes, skin,or hair, hands must be washed.
3. Do not cough or sneeze near foods or clean dishes. Cover nose and mouth with disposable tissue. Wash hands immediately with a germicide soap.
4. Observe no gum chewing, no smoking, and excessive talking rules in serving of food. The reasoning for this stems from the fact that saliva droplets fall out of the mouth unnoticed onto food and contaminate it.
5. Food contact surfaces should never be touched after being washed and sanitized.
6. Keep hands and fingers out of food; do not taste food from fingers.
7. Bacteria causing communicable diseases may be passed on from one person to another by way of food. Persons ill with such diseases must not be allowed to serve or handle food. The same is true for carriers of these diseases.

Sanitation in the Dining Room

Sanitation procedures to be used in setting up the dining room for service include the following guides:

1. Dining room tables must be cleaned and sanitized after each use with no fingerprints, smudges, or crumbs left on them. Food poisoning bacteria will contaminate dining area surfaces, furniture, and anthing else left out that catches dust and film.
2. If linens are used, they must be spotless and kept in sanitized and orderly storage.

3. Salt and pepper shakers, sugar bowls, centerpieces and ashtrays, if used, must be clean, sanitized and filled daily. Sugar bowls must not contain any empty sugar packets.

4. When setting tables, load all glassware, dinnerware, and silverware on sanitized carts. Do not allow them to touch uniform or skin.

5. When setting or clearing off tables, be aware of and replace cracked or chipped dinnerware, glassware, bent, or tarnished silverware. Discard cracked or chipped dinnerware and glassware. Give bent or tarnished silverware to teacher/manager. Never, never use any of these.

6. Do not reuse napkins or placemats that have been on tables in the dining room. Both should be kept in a sanitary storage area.

7. Avoid touching the parts of dinnerware, glassware, and silverware that will be touched by the customer's mouth.

   a. Pick up silverwear or serving utensils by their handles.
   b. Handle glassware by the bottoms and stemware by the stems, or carry them on a small tray. Never carry or touch the tops of glassware.
   c. Pick up cups and saucers by the saucers and cup handles. In carrying more than two cups and saucers, use a tray. Never stack cups or touch the rims.
   d. Handle plates by their edges. Set dishes and plates on table using four fingers under lower edge and thumb on upper rim. Do not extend the thumb over the edge of the rim or touch the food.
   e. Use plates under bowls and handle the plate edge, not the bowl.

Sanitation on the Food Serving Line

Use the following sanitary procedures to set up a food serving line or buffet:

1. Cold items on the serving line must be kept at 45°F or below and hot foods must be kept at 140°F or higher. If foods are placed on the hot food warmer at 170°F (76.6°C) or above, the temperature of the food will seldom drop below 140°F (63.5°C) within a two-hour holding period if steam or electric current has not been turned off during this time.

2. Foods on the serving line should not be placed in deep pans when the contents will not be used during a two-hour serving period. It is much safer to use small, shallow pans that can be replaced more often than deeper ones.

3. No food should be held in a food warmer, holding cabinet, or warm oven between lunch and the evening meal. The temperature is very likely to drop below 140°F (63.5°C) which makes an ideal environment for the growth of bacteria. The range in which bacteria multiply is between 45°F and 140°F.

Under favorable conditions which include warmth, food, and moisture, these bacteria divide once every 20 minutes. In eight hours, one bacterium can multiply into 35,000,000,000,000 (35 trillion) bacteria. They grow day and night and never stop multiplying. Temperatures of over 170°F (76.6°C) are needed to kill bacteria rapidly. Between 140°F (63.5°C) and 170°F (76.6°C) bacteria grow very slowly.

4. Meat probe thermometers are ideal for frequent checking of the internal temperatures of foods.

5. Plastic gloves or plastic handcoverings must be worn when serving food such as potato chips and sandwiches.

6. Use tongs to serve ice in glasses, slices of meat, or rolls on plates.

7. Use a fork for serving butter, cheese, or lemon wedges.

8. Never serve food that has touched the floor.

9. When the food has been spilled in or on the salad bar, food warmer, dessert and salad counter, or any other place on the serving line, wipe it up immediately into a small pan or other container. Do not wipe it onto the floor, and do not leave the scraps in the serving area.

10. Wipe food warmer pan rims, if needed, before putting the pans into the food warmer since heat bakes food onto them.

11. Use FIFO (First-in, first-out) method of storing salads and desserts in a salad and dessert cooler. The ones put in first must be the first ones taken out. Fresh ones should be put behind older items.

Sanitation when Serving Food

The following sanitation procedures must be used when serving a customer or clearing a table:

1. Use a small scoop or tongs for putting ice into a glass. Never use the glass or dip with your hands to bring ice out of ice bin or cart. The ice bin or cart needs to be cleaned and sanitized daily.

2. Wipe all food spills from plate rims with a sanitized cloth before serving the prepared plate to a customer. All food must be on the plate with nothing over the edge. No sloppy plates must be served to the customer since these could become contaminated by touching an unclean surface.

3. No plates must touch the server's clothing, hair, or skin when being taken to the customer. Use a tray unless service is to only one person. When plates are stacked on the server's arm, they touch clothing or another plate (usually the bottom of it). This is unsanitary.

4. When bringing a loaded tray to serve customers, place it on a tray stand; never on the table which you are serving.

5. If a towel is needed to serve a hot plate to a customer, it must be spotless and not touch the food on the plate.

6. Be sure to follow sanitation rules for setting up a dining room when serving plates, dishes, glassware and silverware. Do not let your fingers or hands touch any part of the service items that would come in contact with the customer's mouth.

7. In serving, never stack dishes in such a way that areas which will touch the customer's lips become contaminated.

8. Refill cups and glasses without lifting them from the table. The server could contaminate self by touching where the customer touched.

9. Remove empty dishes from the customer as soon as he or she is finished. Service for a food course should not stay on the table more than two courses later. All food courses must be removed from the table before dessert is served.

10. When clearing, never stack dishes in front or at the side of the table. Put dirty dishes on a bus cart or tray stand away from the table to the customer's back.

11. Crumb the table using a napkin or soft brush. Wipe the crumbs onto a plate. Do not put them on the floor.

12. In serving jello salads or soft desserts such as frosted cake and cream pies, do not serve the item if a thumbprint is seen, a knife has been wiped on the plate edge, or food is spilled on the edge of the plate or dish.

13. All unused food removed from the table must be thrown away. Cream in cream pitchers can be put in a tightly covered container to be used in cooking. Butter patties not completely covered may also be used in cooking. Rolls must be discarded along with salads, desserts, and other foods left on the table by the customer - even though apparently not touched.

14. Money is greatly contaminated by disease-causing bacteria. Keep your hands and fingers away from your hair, eyes, nose, and mouth after handling money. Wash your hands immediately with germicidal soap.

15. When removing an ashtray from a table, cover it with a saucer to prevent ashes from falling onto the customer, table, or floor.

16. When insects such as flies infest the dining room, fumigate the room with insecticides to kill these disease-carrying pests.

SKILL BUILDER

WORDS TO KNOW

Directions:

Each word listed below matches one of the following definitions. Put the letter of the correct matching definition in the blank before each number.

_____ 1. Bacteria

_____ 2. Agar

_____ 3. Incubate

_____ 4. Petri Dish

_____ 5. Deodorant

_____ 6. Nausea

_____ 7. Restraint

_____ 8. Diarrhea

_____ 9. Boil

_____10. Infection

_____11. Antiperspirant

_____12. Contamination

_____13. Designated

_____14. Bacterium

_____15. Probe

_____16. Fumigate

_____17. Infest

_____18. Insecticides

_____19. Germicide

_____20. Communicable

a. Small living cells that can cause infections

b. Transfer of unwanted bacteria from one surface to another

c. Control of hair by hat, scarf, etc.

d. Anything that controls odor

e. Compound that prevents perspiration

f. Set apart for specified purpose

g. A condition that can spread to others

h. Yellowish, thick fluid in a large pimple

i. Very loose bowel movements

j. Feeling of wanting to vomit

k. Small glass dish containing agar where bacteria can grow

l. Food source for growing bacteria

m. Provide proper conditions for bacteria growth

n. To disinfect or purify with fumes killing bacteria and/or insects

o. Substance used to destroy bacteria

p. Slender thermometer used to check internal temperatures of food

q. One bacteria or germ

r. Very large numbers of insects, rodents, or bacteria

s. Poisonous substance used to kill or drive away destructive insects, flies, or rodents

t. Kind of disease capable of being transferred from one person to another

SKILL BUILDER

PERSONAL CARE CHART

Directions:

We all are able to improve. Please rate yourself in the following using "A," "B," or "C" from the key below. Describe what you plan to do to improve anything marked "B" or "C."

KEY : A = Excellent
B = Average
C = Needs Improvement

	M	T	W	T	F	PLAN
1. General Appearance a. Uniform neat, clean						
b. Footwear neat, clean, appropriate						
2. Hair restrained						
3. Minimal jewelry						
4. Control of body odors						
5. Facial Care a. Clean shaven						
b. Light makeup						
c. Skin clean						
6. Clean teeth						
7. Control of breath odor						
8. Hands a. Clean						
b. No polish worn						
c. Nails manicured						

SKILL BUILDER

WHAT KIND OF DINING ROOM EMPLOYEE ARE YOU?

The health of the food handler plays an important part in sanitation. Food personnel working in the dining room service area can transmit bacteria which cause illness in others. Experience has shown that a great number of foodborne illnesses come from workers who are sick, who practice poor personal hygience, or who handle food in unsanitary ways. Even a healthy person may harbor food-poisoning bacteria in the nose, mouth, throat, and intestinal tract. The food handler's hand and working habits are very important. Undesirable ones such as touching the nose or mouth, scratching the head, and arranging the hair, transfer bacteria from the worker to food and eating utensils. Being conscious of good habits and practicing them is the best way to protect yourself, your co-workers, and your customers.

Put a check mark in the space before each item that applies to you now. On another sheet, list your strengths in maintaining sanitary conditions as a server in the dining room and areas in which you need to improve. Set goals for yourself. Re-take the evaluation in one month and share any changes.

Head

1. ( ) Greasy hair
2. ( ) Hair needs combed
3. ( ) Hair needs trimmed
4. ( ) Dirty neck
5. ( ) Dirty ears

Face

6. ( ) Needs shaved
7. ( ) Too much makeup
8. ( ) Blackheads or pimples
9. ( ) Greasy
10. ( ) Green or yellow unclean teeth
11. ( ) Chewing gum
12. ( ) Smoking

Hands

13. ( ) Hands are dirty
14. ( ) Fingernails are dirty
15. ( ) Fingernails need trimmed
16. ( ) Nail polish

Odor

17. ( ) Body odor
18. ( ) Foot odor
19. ( ) Bad breath
20. ( ) Dirty outer garments
21. ( ) Dirty undergarments
22. ( ) Too much scent (perfume, cologne, after shave)

What You Wear

23. ( ) Dirty uniform
24. ( ) Spots on uniform
25. ( ) Wrinkled uniform
26. ( ) Zipper or other closures missing
27. ( ) Dirty collar or cuffs
28. ( ) Dirty tie
29. ( ) Soiled underclothes
30. ( ) Runs in hose or socks
31. ( ) Dirty shoes
32. ( ) Runover heels on shoes
33. ( ) Unrepaired shoes
34. ( ) Dirty hose or socks
35. ( ) Hem out of uniform
36. ( ) Uniform top not completely closed
37. ( ) Rip in uniform not mended
38. ( ) Dirty hat
39. ( ) Wrinkled hat

How You Act

40. ( ) Silly
41. ( ) Excessive noise
42. ( ) Poor manners
43. ( ) Hands not washed when required
44. ( ) Groups with others to waste time
45. ( ) Does not clean and sanitize dining area correctly
46. ( ) Does not serve customer in sanitary manner
47. ( ) Doesn't control sneezes, coughing, or blowing of nose
48. ( ) Does not refrain from touching hair, skin, or face
49. ( ) Has open cuts, burns, or sores on hands

SKILL BUILDER

SANITATION IN THE DINING ROOM

Directions:

Develop a chart to use in the dining area to check that proper procedures of sanitation are regularly practiced in setup, service, and cleaning. Use the chart for one week. Evaluate the results and make necessary changes in habits.

a bird's eye view

MAINTAINING SANITARY FACILITIES AND EQUIPMENT

Understand this science concept:

Microbe growth can be stopped or inhibited by heat, chemicals, or radiation.

Teacher Materials
Information Sheet
Sample Lesson Plan

Student Materials
Assignment Sheet: Maintaining Sanitary Facilities and Equipment
Information Sheets: Sanitizing Facilities and Equipment
Sanitizers
Skill Builders: Words to Know
Sanitation Evaluation Chart
Cleaning and Sanitizing Chart

TEACHER INFORMATION SHEET

Understand this science concept:

Microbe growth can be stopped or inhibited by heat, chemicals or radiation.

Microorganisms can be controlled by being killed or being inhibited in their growth. This can be accomplished by the use of heat, chemicals, or radiation.

Before discussing how to use heat, chemicals, or radiation to control microbial growth, it is important to clarify the difference between clean and sanitized.

Clean means the absence of soil.

Sanitize means that bacterial contamination has been reduced to a safe level.

Sterile means the complete destruction of all living organisms.

An article or surface may appear to be clean but may not be sanitized; or it may be sanitized but not look clean. When using a sanitizing solution, the article must be physically clean before it can be sanitized. Soil will prevent a sanitizing solution from coming into contact with all the microorganisms.

Heat Sanitizing

Exposing a clean object to sufficient heat for an adequate length of time kills microorganisms. Most are quickly killed by temperatures near boiling. Bacterial endospores, however, are resistant to heat and may survive hours of boiling. Such spores are common in soil, dust, and air. To insure destruction of such spores, the best procedure is to heat under pressure. In pressures above atmospheric level, the temperatures can be increased above 100°C. Pressure cookers and autoclaves are devices for heating under pressure. Some items, which cannot be sterilized under pressure because of sensitivity to heat, can be sterilized by steam. Dry heat is another way to sterilize the object. This can be accomplished in an ordinary kitchen oven. At least 90 minutes heating at 160-170°C is necessary for dry-heat sterilization.

In the food service industry there are many practical applications for heat sterilization. Pasteurization is an example of sterilizing food by the use of heat. Milk is pasteurized by heating to 140°F for 30 minutes. Boiling foods during preparation or reheating them serves the same purpose. Immersion of dishes in 170°F water for a half minute or more will usually accomplish adequate sanitizing. In mechanical dishwashing, steam and hot running water are used as sanitizers. Since water loses heat quickly when sprayed on a cold surface, the temperature of the object being sanitized is important, not the temperature of the water or steam.

Chemical Sanitizing

Chemical compounds can be used to sanitize. Antimicrobial agents are chemicals that kill or inhibit the growth of microorganisms. Agents that kill or inhibit the growth of microorganisms are called "cidal" agents, with the prefix indicating the kind of organisms killed.

Bactericidal

Fungicidal

Algicidal

A bactericide kills bacteria. Germicides kill a broad spectrum of organisms. Germicides are sometimes divided into two groups: antiseptics and disinfectants.

> An antiseptic is a germicide that can kill most microorganisms but is harmless when applied to the skin. It should not be taken internally. Soaps containing antiseptics leave a residue on the skin after the soap is rinsed off. This active residue inhibits microbial growth for some time.
>
> A disinfectant is an agent that kills microorganisms but is not safe for application to living tissue. Its use is restricted to objects such as tables, floors, and dishes.

How do antiseptics and disinfectants act?

Antiseptics and disinfectants alter the proteins of the microbial cells so they are no longer functional. Cells cannot live without protein. Since human tissues also contain protein, many compounds are not suitable for use on humans.

Sanitizing Compounds

Chlorine, iodine, and quaternary ammonium are the three most commonly used sanitizing compounds. Chlorine and iodine kill most bacteria when used properly. Both lose some effectiveness in water that is too alkaline. For this reason, dishes and utensils washed with general-purpose detergents that are alkaline must be thoroughly rinsed before they are sanitized.

Quaternary ammonium is non-corrosive and effective in both acid and alkaline solutions. A blend of quats compounds kills a greater variety of microorganisms than just one quatenary compound. Very hard water will make quats less effective.

Some sanitizing agents are toxic and are not acceptable for surfaces used for food preparation. Some impart undesirable flavors and odors.

Detergents

Detergents are often used in food service establishments to remove soil. They are synthetic compounds which act like soap. Unlike soap, they do not react with the calcium and magnesium salts in hard water to form scum. Synthetic detergent formulas can be manufactured to produce the desired amount of suds for any use. Detergents used in the food service industry are chemical compounds prepared for specific purposes such as on floors, in dishwashers, or for removing mineral deposits. A detergent should be selected for its specific cleaning properties. A compound which is effective for one application may be totally ineffective for another.

A good detergent will loosen and remove soil and will keep it suspended in the cleaning solution. It must condition the water, be noncorrosive, nontoxic, and safe when used in the food preparation area. Detergents are classified according to their composition and intended use.

1. General purpose detergents are mildly alkaline and effective for most soil removal and suspension.

2. Heavy duty detergents are highly alkaline. They break down protein soils and fats. One use is in dishwashing machines.

3. Acid detergents are used in removing mineral build-up such as mineral deposits left by water.

4. Detergents with sanitizing agents are used in treating heavily soiled items and areas such as waste receptacles and loading docks. They can only be used where food contamination is not a problem.

5. Special purpose detergents are available for oven cleaning, tarnish/stain removal, scouring, and polishing. Many of these compounds are toxic and should be stored away from food preparation and handling areas.

Radiation

Radiation is energy in the form of rays of light, heat, etc., coming from natural or artificial sources. Some types of radiation cause the death of microorganisms. Germicidal ultraviolet radiation can be used to sterilize air or surfaces such as toilet seats or counter tops.

Thomas D. Brock & Katherine M. Brock, Basic Microbiology with Applications (Englewood, NJ: Prentice-Hall, Inc., 1978).

Applied Food Service Sanitation (where published: National Institute for the Food Service Industry, 1974).

SAMPLE LESSON PLAN

Science Concept: Sanitation - Controlling Microbial Growth
Task: Maintain Sanitary Facilities and Equipment

Objective: The student will be able to:

1. Explain the need to follow sanitary procedures carefully to insure the health of both workers and customers.
2. Apply basic science information to the practical problems of cleaning and sanitizing the food service facility and equipment.

Teaching Aids:

Collection of detergents and sanitizers
Chalkboard

I. Preparation of the Learner:

Cleanliness and sanitation and the prevention of contamination from microorganisms is important in all phases of the food service industry from delivery to food preparation and service. Poor standards of cleanliness leave lasting impressions and can repel customers. Proper sanitizers and disinfectants are important tools in maintaining healthful, attractive foods and facilities.

II. Presentation:

CONCEPT	CLASSROOM ACTIVITY
Certain chemical compounds exert an inhibiting action upon microorganisms. In some instances the action prevents the multiplication of microorganisms, while in others, the cells are killed.	Lecture on detergents and sanitizers using the Teacher Information Sheet. Arrange a display of detergents and sanitizers used in your food service facility. Pass the items around the classroom so that each student has an opportunity to study each detergent or sanitizer. Have them complete the Skill Builder - Cleaning and Sanitizing Chart. Draw the chart on the chalkboard and summarize the information.
Exposure to sufficient heat kills bacteria	List on the chalkboard examples of how the following principle could be applied: Heat destroys microorganisms. Review the vocabulary words. Read the information sheets.

III. Application:

The Skill Builders may be completed individually or in groups. Suggested ideas for using these student assignment sheets include:

Sanitation Evaluation Chart - Large group activity. The entire class may discuss and evaluate the content of the charts.

Sanitation Evaluation Chart - Individual activity. Students may individually evaluate the quality of cleanliness by work stations or other arrangement.

IV. Evaluation

TEST - MAINTAINING SANITARY FACILITIES AND EQUIPMENT

1. Equipment which has been sanitized
   - a. has had all the soil removed
   - b. has had all living organisms killed
   - c. has had bacterial contamination reduced to a safe level
   - d. all of the above

2. General purpose detergents are used
   - a. to remove mineral build-up
   - b. to clean ovens
   - c. in a dishwashing machine
   - d. to wash pots and pans

Name the three most common types of sanitizers.

3.____

4.____

5.____

6. Why must dishes washed with general purpose detergents be thoroughly rinsed before they are sanitized?

7. Give an example of a cleaning project that would require an acid detergent.

8. What type of detergent should be used in a dishwashing machine?

ASSIGNMENT SHEET

Science Concept: Sanitation - Controlling Microbial Growth

Task: Maintain Sanitary Facilities and Equipment

Why learn this?

As a food service worker, one must control contamination and spoilage by properly cleaning and sanitizing the facilities and equipment. This is important for the health of both the workers and the patrons.

Principle Emphasized:

Microbe growth can be stopped or inhibited by heat, chemicals,or radiation.

Words to Know:

Alkaline
Antiseptic
Bactericide
Clean
Deliming
Detergent

Disinfectant
Germicide
Neutralize
Residue
Sanitizing
Sterile

Resources: Information Sheets - Sanitizing Facilities and Equipment
Sanitizers

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1. Read the resources
2. Complete Skill Builder - Words to Know
3. Complete Skill Builder - Sanitation Evaluation Chart
4. Complete Skill Builder - Cleaning and Sanitizing Chart

INFORMATION SHEET

SANITIZING FACILITIES AND EQUIPMENT

Business will increase when the facility and equipment are clean and sanitized, because a clean appearance will:

1. Attract customers
2. Gain customer confidence
3. Provide for greater customer safety
4. Provide a better working environment for employees
5. Eliminate unsanitary conditions, food-diseased materials, and kitchen pests

Cleaning and sanitizing should be performed in one operation using special cleaning and sanitizing agents. A surface appears clean when it is free of soil. However, it is bacteriologically clean only when a bactericide has been used in the cleaning process. Good cleaning and sanitizing procedures help to break the chain of infection between the source of disease and the customer.

Those areas needing to be cleaned in a food establishment are the:

1. Entry
2. Floors, walls,and ceilings
3. Windows
4. Furniture
5. Tableware
6. Light fixtures, decorations
7. Menus
8. Ventilators
9. Equipment, including food preparation surfaces
10. Dishroom
11. Restrooms and locker rooms
12. Storage areas
13. Garbage cans

The following chart summarizes front-of-the-house areas to be cleaned and sanitized, performance standards, and the methods used for cleaning and sanitizing.

FRONT-OF-THE-HOUSE -- CLEANING AND SANITIZING

Areas/Items	Performance Standards	Methods for Cleaning and Sanitizing
1. Entry and Dining Room	Floors: Carpeted floors should be free from spots and dirt. Hard surface floors should be smooth and shining.	Move all furniture away from walls. Carpet: 1. vacuum daily 2. remove any spots with carpet cleaner 3. Shampoo as needed using carpet scrubbing machine Hard surface flooring 1. Dry mop or sweep to remove loose dirt 2. Scrub with germicide detergent; wet mop daily
	Walls and Ceilings: Clean, free from film, dirt, marks, and cobwebs.	1. Dry dust or dry mop to clean cobwebs. 2. Wash with a neutral cleaning solution using manufacturer's directions. For stubborn stains, use a scouring powder to clean by friction and rubbing. Rinse with clean cloth or sponge and clean water.
	Windows: Clean, shiny, free from streaks, spots, dirt, and film.	1. Remove draperies or curtains and clean window coverings. 2. Prepare a solution of vinegar and water, ammonia and water, or commercial cleaner. 3. Wash windows with cloth and cleaning solution using friction. Stubborn spots and stains may be removed with careful use of razor blade. 4. Use paper or lint-free cloth to polish glass.
	Furniture: Upholstered pieces free of dirt and spots, in good repair. Other pieces, shining, free from dirt, food particles, and stickiness.	Upholstered: See carpet care above. Make repairs as needed. Wood: 1. Dust daily with clean cloth and commercial cleaner. Wipe in direction of wood grain to prevent streaking. 2. Touch up nicks and spots with wood stain.

FRONT-OF-THE-HOUSE -- CLEANING AND SANITIZING

Areas/Items	Performance Standards	Methods for Cleaning and Sanitizing
	Centerpieces and Condiments: Clean, free of dirt and stickiness.	1. Centerpieces, salt and pepper shakers, and sugar holders should be washed daily to reduce bacteria.
	Table Appointments: Napkins and table coverings spotless and in good repair.	Table coverings, napkins: 1. Wash daily. Do not use items again that have been set at a table even though they may not have been used.
	Silverware: Without fingerprints, smudges, or spots.	Silverware: 1. Flush dirt and food particles away with water. 2. Put in silverware soak that contains a bactericide. 3. Put silverware in dishwashing machine rack; wash with detergent and spotting agent at 160°F (70°C). Sanitize in rinse water of 170-180°F (75-85°C). 4. From rack, put in cylinders with handles up; run through dishwashing machine again to air dry. 5. Use from these cylinders, transfer to other clean cylinders, or store in silverware dresser with handles convenient to grasp.
	Dinnerware: Without fingerprints, smudges, spots; perfectly clean.	1. Fill detergent dispensers and rinse dry dispensers. 2. Scrape and flush off food particles. 3. Place in racks or onto conveyor belt, stacked according to size and shape. 4. Rack cups and glasses, open end down. 5. Put through dishwashing machine at same temperatures recommended for silverware to clean and sanitize. 6. Air dry; stack and put in dish area or lowerator.

FRONT-OF-THE-HOUSE -- CLEANING AND SANITIZING

Areas/Items	Performance Standards	Methods for Cleaning and Sanitizing
2. Fixtures and Decorations	Lights and Accessories: Free from dust, spots of film; this includes globes for lights and candles, pictures, metal and wood decorations.	1. Wash globes for lights and candles frequently by putting in racks and washing in the dishwashing machine. Dry by using lint-free cloth or paper towels. 2. Dust and polish metal and wood fixtures frequently. 3. Dust pictures and frames.
3. Menus	Menu: Free from finger marks, dirt, food stains, and stickiness.	1. Discard if unable to clean. 2. When the material permits, wipe with damp cloth dipped into solution of bactericide and water. Follow manufacturer's directions for use of bactericide.

Other guidelines for cleaning the front-of-the-house include the following.

1. Apply wax to floors after old wax has been removed.
2. Ice may be needed for removal of gum stuck to carpet, draperies, upholstery fabrics.
3. Spills need to be wiped up immediately to prevent permanent spotting of furnishings or carpeting.
4. Burns from cigarettes may require a spot remover for carpets or may even need to be trimmed and repaired with a plug of carpeting.
5. Dust, dirt, film, or smudges should be eliminated from everything in a food service operation since bacteria can hide and grow in these.
6. Detergent concentration must be maintained at the level necessary for effective washing and sanitizing.
7. The person who is working in the dishroom must not handle any of the clean dishes until his or her apron is removed and hands thoroughly washed. Contamination of sanitized dishware can result from working back and forth in dirty and clean areas without using proper sanitation procedures.
8. Store dishes, glasses, and silver using proper handling to protect from contamination; i.e., a) stored to protect from splash, dust, and other contaminants, b) silver should be touched on handles only, c) cups, glasses, and bowls should be handled so fingers and thumbs do not touch the rim or inside surfaces, d) stemware should be handled by the stem and bottom. Touch as little as possible to avoid prints.
9. Clean and sanitary cloths must be used for wiping dining tables and chairs.

BACK-OF-THE-HOUSE -- CLEANING AND SANITIZING

Areas/Items	Performance Standards	Methods for Cleaning and Sanitizing
1. Preparation and Cooking	Floors: Free of debris, boxes, food particles and scraps, paper, and moisture or grease.	1. Wipe spills immediately. 2. Dry mop and wet mop daily; use a disinfectant solution to prevent growth of microorganisms. 3. Follow procedures recommended for entry and dining areas, front-of-the-house, and for other floor coverings. 4. Scrub or flush floor drains daily. 5. Spot mop as required.
	Walls and Ceilings: See front-of-the-house procedures.	
	Ventilators: Free from dirt, dust,and grease.	1. Keep ventilators in good repair. Proper ventilation and reduced condensation prevent growth of mold and bacteria. 2. Clean hoods and grease filters frequently to prevent build-up of dirt and oils. Use a commercial degreaser.
	Equipment and Surfaces in Contact with Food: Maintain spot-free and sanitized.	1. Wash item before using; follow manufacturer's directions. 2. Wash with detergent and water. 3. Apply friction with brush or sanitary cloth. 4. Rinse and sanitize. 5. Air dry; wood surfaces must be dried immediately. 6. Remember to clean all grease traps and drip pans.
	Equipment and Surfaces Not in Contact with Food: Maintain spot-free and sanitized.	1. Wash with detergent and water. 2. Apply friction with sanitary brush or cloth. 3. Rinse and air dry.

BACK-OF-THE-HOUSE -- CLEANING AND SANITIZING

Areas/Items	Performance Standards	Methods for Cleaning and Sanitizing
2. Dishroom	Dishwashing machine, Equipment, and Foors: Spotless and well-cleaned; storage for dirty and sanitized items separated.	1. Clean the dishwashing machine according to the manufacturer's directions. 2. Flush the drains. 3. Scrub floor using detergent-germicide. 4. Empty all waste containers regularly; line containers, wash and disinfect as needed.
3. Garbage and Refuse	Garbage Collection Areas and Containers: Pleasant odor; area kept dry, free from spills and trash; waste in containers with lids on; area neat and orderly; no evidence of rodents and insects.	1. Empty containers daily. 2. Clean containers inside and outside daily; sanitize as needed. 3. Line containers with plastic bags. 4. Keep lids firmly attached to containers. 5. Clean floors with germicide or bactericide daily.

INFORMATION SHEET

SANITIZERS

Germicides, disinfectants, and sanitizers share the following characteristics:

1. Must be registered with the United States Department of Agriculture in order to be identified as germicides, disinfectants, and sanitizers.
2. Can be used to clean anything that can be washed with water.

BE CAUTIOUS! Follow the manufacturer's directions for use of the product. The label contains important information about the quantity to be used to avoid waste and to give effective cleaning and sanitizing action. Avoid combining preparations because of the likelihood of chemical reaction. Commercial preparations are already combined, so when used by themselves according to directions there is little danger of a bad reaction. The following chart identifies cleaning and sanitizing products, how they should be used, and precautions to follow.

PRODUCT	USE	PRECAUTIONS
Dishwashing machine detergent	Used in the dishwashing machine	Wear rubber gloves when filling or handling hose.
3-Well sink detergent	Use in first compartment of 3-vat sink for washing pots and pans at 110°F (43°C).	Wear rubber gloves if allergic to detergent and to protect hands from extremely hot water.
Germicide soap	Wash hands.	Do not touch any unclean surface after using.
Silverware detergent -- germicide presoak	Put into bus tub with water; put all silverware into this solution as it is taken into the dishroom. Let soak until tableware is to be washed in the dishwashing machine.	Wear rubber gloves if allergic to detergent.
Disinfectant or sanitizer	Use in third compartment of 3-vat sink at temperature of 170°F (77°C).	Use rubber gloves if allergic to disinfectant.

PRODUCT	USE	PRECAUTIONS
Degreaser	Removes grease film, build-up or burned-on grease.	Use with open windows or ventilation; wear rubber gloves and goggles.
Deliming agent	Removes lime and scale from hot water and steam equipment such as dishwasher, inside of steamer, water valves, faucet area, tea kettles, proof cabinets.	Wear rubber gloves and goggles.
Urn cleaner	Aklaline substance that reacts with tannins in coffee and tea cups to remove stains.	Wear rubber gloves if allergic.
Baking soda or soda product	Use in refrigerators for cleaning purposes or expose in dry form to neutralize odors.	None
Charcoal briquettes	Use in open containers in refrigerator, cooler, and freezer to absorb odors.	None
Water	Combines with cleaning products to neutralize soil.	None, unless combined with cleaning product that requires precautions.
Stainless steel cleaner	Spray on and polish nonfood surfaces.	Flammable.
Vinegar or lemon juice	Neutralizes soap residue on surfaces.	None.
Lye or caustic soda	Use to clean sink drains.	Wear rubber gloves; work in well-ventilated area.

PRODUCT	USE	PRECAUTIONS
Furniture cleaner/ polish	Used to spray, clean, and polish furniture.	None, unless allergic.
Ice	Cleans grease from garbage disposer and wets parts that might otherwise be missed.	None, except the safety precautions required in using the garbage disposer.
Oven cleaner	Use on ovens to dissolve carbonized or burned-on food and grease.	Wear rubber gloves, goggles; work in a well-ventilated area.
Chlorine	Removes stains and acts as a disinfectant.	Wear rubber gloves and work in a well-ventilated area.
Ammonia	Removes film and dirt from most surfaces.	Wear rubber gloves and work in a well-ventilated area.
Glass cleaner	Spray on, clean and polish windows, mirrors, and sneeze guards.	None.
Wetting agent	Surface tension, releases water in sheets and reduces spotting action.	None.
Iodine	Use a disinfectant.	Wear rubber gloves.
Germicide	Use with water to kill bacteria.	Wear rubber gloves, work in a well-ventilated area.
Bactericides	Used with water to kill pathogenic and nonpathogenic bacteria.	Wear rubber gloves, work in a well-ventilated area.
Abrasive cleaners	Use on pans to loosen soil.	Wear rubber gloves; do not use on stainless steel or chromium-plated surfaces.

SKILL BUILDER

WORDS TO KNOW

Directions:

Use each of the following vocabulary words in a separate sentence. The sentences must be related to maintaining sanitary conditions in a food service establishment.

1. Alkaline ________________________
2. Antiseptic ________________________
3. Bactericide ________________________
4. Clean ________________________
5. Deliming ________________________
6. Detergent ________________________
7. Disinfectant ________________________
8. Germicide ________________________
9. Neutralize ________________________
10. Residue ________________________

11. Sanitizing ____________________

____

12. Sterile ____________________

____

SKILL BUILDER

SANITATION EVALUATION CHARTS

Directions:

Use the cleaning evaluation charts to check the standards of cleanliness of the entryway, waiting room, restrooms, dining and serving areas, dishwashing and storage, and refuse and disposal areas in the food service facility. From the information collected on the evaluations, establish a cleaning schedule for each area and assign responsibilities. Periodically use the charts to re-evaluate.

ENTRANCE, FOYER, WAITING ROOM

Date Reviewed:________________

By:___________________________

ITEM	YES	NO	COMMENTS ON PROBLEMS AND STEPS REQUIRED	DATE CORRECTED
Entryway and waiting room: Clean and attractive?				
Area: Free from litter?				
Chairs and benches and lamps: Clean and free from dust?				
Posters and printed materials: Clean and neatly racked or posted?				
Customer's first view of establishment: Conveys the image of cleanliness and freshness?				

DINING ROOM AND SERVING

Date Reviewed:________________

By:__________________________

ITEM	YES	NO	COMMENTS ON PROBLEMS AND STEPS REQUIRED	DATE CORRECTED
Dining area, including floor, tables, and chairs: Clean and dry?				
Tableware: Clean, sanitized, and stored in a manner to prevent splash and contamination?				
Single service items: Stored and dispensed in a sanitary manner?				
Single service items: Disposed of after single use?				
Clean and sanitary cloths: Used for wiping dining tables and chairs?				
Silverware and serving utensils: Stored and presented in a manner to prevent contamination and to insure being picked up by handles?				

RESTROOMS

Date Reviewed:________________

By:________________

ITEM	YES	NO	COMMENTS ON PROBLEMS AND STEPS REQUIRED	DATE CORRECTED
Customer restrooms: Clean, dry, light, well-ventilated, and free of odor?				
Sanitary equipment: Operating satisfactorily?				
Soap, towels, and tissue: Supply is satisfactory?				
Waste containers: Covered and kept clean?				
Waste containers: Emptied frequently?				
Hot and cold water: Supply is adequate?				
Drains: Operating in a satisfactory manner?				
Rodents and insects: Are signs observed?				
Toilet doors: Self-closing and in good working order?				

WAREWASHING AND STORAGE

Date Reviewed:________________

By:____________________

ITEM	YES	NO	COMMENTS ON PROBLEMS AND STEPS REQUIRED	DATE CORRECTED
Sufficient hot water: To meet the warewashing requirements?				
Wash and rinse temperatures: Proper for the type of machine and ware being washed, being maintained?				
Rinse temperature: At least 170°F maintained for tableware and utensils?				
Dishes and utensils: Pre-scraped and flushed prior to washing?				
Detergent concentration: Maintained at the necessary level for effective washing?				
Separate personnel: Used for removing and storing clean tableware or do warewashing personnel wash hands between handling soiled tableware and sanitized ware?				
Warewashing equipment: Cleaned after each day's use to remove chemicals, food particles, soil, and debris?				
Jets and nozzles: Cleaned of food particles and other obstructions and contaminants?				

WAREWASHING AND STORAGE (Continued)

ITEM	YES	NO	COMMENTS ON PROBLEMS AND STEPS REQUIRED	DATE CORRECTED
Cleaned and sanitized wares and utensils: Stored off the floor and in a clean, dry location?				
Drying: Proper toweling of tableware and utensils observed?				

GARBAGE AND TRASH AREAS

Date Reviewed:__________________

By:____________________________

ITEM	YES	NO	COMMENTS ON PROBLEMS AND STEPS REQUIRED	DATE CORRECTED
Area: Generally clean and orderly?				
Floor, platform, or ground surface: Free from spilled particles of food?				
Area: Free from objectionable odor?				
Grease and other liquid spillage: On floor, platform, or ground surface?				
Spilled food particles and litter: Present in front of incinerator, dumpsters, etc.?				
Trash and garbage containers: Clean on the outside?				
Can liners: Are in use. All garbage containers are closed with tight-fitting covers?				
Trash: Confined in orderly fashion or in suitable containers?				
Trash: Accumulation of trash because of infrequent pick-up?				

GARBAGE AND TRASH AREAS (Continued)

ITEM	YES	NO	COMMENTS ON PROBLEMS AND STEPS REQUIRED	DATE CORRECTED
Spills: Are there puddles of wash water and food particles and liquids?				
Vermin: Evidence of rats, rat holes or nests in the vicinity of the disposal area?				
Empty garbage and refuse containers: Washed prior to being returned for use?				
Mop water: Properly disposed of?				
Trash: Accumulated in corners, under stairs or platforms?				

SKILL BUILDER

CLEANING AND SANITIZING CHART FOR THE FOOD SERVICE LAB

Directions:

Use the blank form to set up a cleaning and sanitizing chart for your lab. Categorize the products and describe the procedures for correct use by referring to the Information Sheet and the product label.

PRODUCT	BRAND NAME	USES (FROM LABEL)	MANUFACTURER'S DIRECTIONS	LABEL PRECAUTIONS	pH ACID BASE

a bird's eye view

MAINTAINING SANITATION IN FOOD PREPARATION AREAS

Understand these science concepts:

Microorganisms are everywhere except in sterile environments.

Many microorganisms bring about good changes in food; others cause spoilage and illness.

Teacher Materials

Information Sheet
Sample Lesson Plan

Student Materials

Assignment Sheet:	Sanitation in Food Preparation Areas
Information Sheet:	Sanitation in Food Preparation Areas
Skill Builders:	Words to Know Foodborne Illness Illness Caused by Contaminated Foods Food Handling Procedures

TEACHER INFORMATION SHEET

Understand these science concepts:

Microorganisms are everywhere except in sterile environments.

Many microorganisms bring about good changes in food; others cause food spoilage and illness.

Microorganisms that affect food are classified as yeast, mold, virus, and bacteria. They are found everywhere. Many microorganisms can cause sickness, disease, and even death.

Food poisoning is the result of eating food that has been contaminated by yeast, mold, virus, and bacteria. These food contaminators cause people to become seriously ill or in some cases even result in death. The following chart identifies the four major sources of food contamination:

FOOD CONTAMINATION	TYPES OF FOODS AFFECTED	CHARACTERISTICS
Yeast	Acidic fruits, tomato products	Bubbles, with slightly clear centers on surface of food product that is normally smooth; sour odor
Mold	Meats, breads, cheese	Slightly raised surface spots; color usually greenish-gray, gray, or blue-gray
Virus	Does not infect food directly, but uses it as a means of transportation; water sometimes is a source of contamination	Variety of characteristics; stop transmission by protecting food from infected individual
Bacteria	Mostly meats and meat products	Off odor, off-color

Yeasts, from the public health point of view, are harmless. They can easily be killed by boiling. They are used in making a variety of foods including bread, wine, and beer. While harmless, they are unappetizing when found in tomato products, acidic fruits, and other foods not regularly processed with yeast.

Molds are a frequent cause of food spoilage. A few are suspected of causing illness in humans. Certain molds are useful, such as those used for ripening Blue, Roquefort, and Gorgonzola cheeses, and those which are used to make penicillin in the medical field. Unless a mold is used in food processing, as with cheese, there is no excuse for food to be moldy. Presence of mold indicates poor food management.

Viruses are smaller than the smallest bacteria. They cannot multiply in foods but are transmitted through foods from person to person. Examples of those known to be transmitted through food are the viruses of infectious hepatitis and polio. It is critical for the food worker to wash his or her hands thoroughly before touching food.

Bacteria pose a serious threat to public health through contaminated foods. While some work for the health of humans, and some neither help or hurt, others cause diseases that can threaten health and life. These must be controlled. The following chart identifies the most harmful bacteria, symptoms of illnesses, and causes:

BACTERIA/DISEASE	SYMPTOMS OF ILLNESS	CAUSES
Botulism	Nausea, vomiting, dizziness, double vision, difficulty in breathing. Small amount of food can cause death.	Caused by toxin that develops in underprocessed home canned or commercially canned low-acid vegetables and meats.
Dysentery	Diarrhea, abdominal cramping	Water contaminated by defective plumbing; infection of foods prepared with unclean hands; contamination by flies.
Perfringens	Nausea, vomiting, diarrhea	Contamination of foods prepared in advance and held warm for several hours; cooked foods may be recontaminated through contact with infected cutting boards and other equipment. Occurs most often in reheated foods and leftovers.
Salmonella	Nausea, vomiting, diarrhea	Develops in raw or cooked foods left unrefrigerated and uncovered. Foods most often infected are shell-

BACTERIA/DISEASE	SYMPTOMS OF ILLNESS	CAUSES
Salmonella (Cont'd)		fish, poultry, eggs, dairy products, custards, soups, gravies and sauces, and foods that have been rewarmed.
Staphylococcus	Nausea, vomiting, diarrhea	Toxin produced by staph bacteria from contact with infections in boils, cuts, abscesses on skull, nose, or mouth of food handlers. Contamination most common in protein foods: meats, fish, poultry, egg and milk products, and any of these combined with salad dressing.
Streptococcus	Sore throat, nausea	Infection from nasal or oral discharges carried through coughing, sneezing, tasting, talking, or breathing on food.
Trichinosis	Nausea, vomiting, diarrhea, muscular soreness	Insufficiently cooked meat products that are infected with trichina worm; pork products are a major source.

SAMPLE LESSON PLAN

Science Concept: Sanitation - Foodborne Illness
Task: Maintain Sanitation in Food Preparation Area

Objective: The student will be able to:

1. Name the microorganisms which cause different foodborne illnesses.
2. Prevent foodborne illness through the use of proper food handling techniques.

Teaching Aids:

Six Petri Dishes
Agar

I. Preparation of the Learner:

The customer has a right to healthful food and clean service. As a food service employee, you have the responsibility to provide both. In meeting this obligation, it is necessary for you to practice consistently. food handling techniques which prevent foodborne illnesses.

II. Presentation:

CONCEPT	CLASSROOM ACTIVITY
Microorganisms are everywhere except in sterile conditions Microorganisms that affect food are yeast, mold, virus, and bacteria.	Lecture using Teacher Information Sheet. Experiment: Contaminate the agar in six petri dishes with body materials and incubate for one week. Evaluate the growth of the cultures and record the results. Experiments might include contaminants from: HANDS Before washing ____________________ After washing ____________________ After touching face ____________________

II. Presentation:

CONCEPT	CLASSROOM ACTIVITY
	SALIVA After coughing____________ ____________________ After licking spoon________ ____________________ STRANDS OF HAIR ____________________ ____________________ ____________________
Many microorganisms bring about good changes in food; others cause food spoilage and illness.	Review the vocabulary words. Read the Information Sheets.

III. Application:

Have students individually complete Skill Builders on the Student Assignment Sheet.

OR

Have students complete Skill Builders as a class activity.

IV. Evaluation

TEST - CAUSES OF BACTERIA/DISEASE

Directions:

Match the bacteria/disease with the cause.

1. Staphylococcus ________
2. Streptococcus ________
3. Salmonella ________
4. Perfringen ________
5. Botulism ________
6. Trichinosis ________
7. Dysentery ________

A. Water contaminated by defective plumbing; infection of foods prepared with unclean hands; contaminated by flies.

B. Infection from nasal or oral discharges carried through coughing, sneezing, tasting, talking, or breathing on food.

C. Contamination of foods prepared in advance and held warm for several hours; cooked foods may be recontaminated through contact with infected cutting boards and other equipment. Occurs most often in reheated foods and leftovers.

D. Toxin produced by staph bacteria from contact with infections in boils, cuts, abscesses on skull, nose, or mouth of food handlers. Contamination most common in protein foods: meats, fish, poultry, eggs and milk products, and any of these combined with salad dressing.

E. Develops in raw or cooked foods left unrefrigerated and uncovered. Foods most often infected are shellfish, poultry, eggs, dairy products, custards, soups, gravies and sauces, and foods that have been rewarmed.

F. Insufficiently cooked meat products that are infected with trichina worm; pork products are a major source.

G. Caused by a toxin that develops in underprocessed home canned or commercially canned low-acid vegetables and meats.

ASSIGNMENT SHEET

Science Concept: Sanitation - Foodborne Illness

Task: Sanitize the Food Preparation Area

Why learn this?

In protecting public health, as well as our own as food service employees, we must be able to identify potentially dangerous situations where bacteria and other microorganisms and carriers can destroy food and cause illness and even death to the victims. We must do all we can to reduce the hazards and maintain conditions of cleanliness and sanitation in food management and service.

Principle Emphasized:

Understand these science concepts:

Microorganisms are everywhere except in sterile environments.

Many microorganisms bring about good changes in food; others cause food spoilage and illness.

Words to Know:

Accumulated
Bacteriologically
Corrosion
Cross Contamination
Disinfectant
Dismantled
Exposure
Germicide
Infestation
Perfringens
Poisonous
Probe
Salmonella
Staphylococcus
Streptococcus
Toxin
Trichina Parasite

Resources: Information Sheet - Sanitation in Food Preparation Areas

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1. Read the resources
2. Complete Skill Builder - Words to Know
3. Complete Skill Builder - Foodborne Illness
4. Complete Skill Builder - Illnesses Caused by Contaminated Food
5. Complete Skill Builder - Food Handling Procedures

INFORMATION SHEET

SANITATION

IN FOOD PREPARATION AREAS

The quality and wholesomeness of prepared food must be safeguarded through use of sanitation practices and procedures in the food preparation areas. These include effective control of food temperature at all times. In sanitary food service operations, only clean, safe food brought from a reputable purveyor must be served to the public if food poisoning is to be prevented.

Good food handling practices and conditions make poor bacterial growth conditions. One person who handles food improperly or who is sick can cause many people to become ill through contaminated food. Hands must be washed repeatedly to prevent foodborne illness. Work surfaces, equipment, and utensils in the preparation area must be clean and sanitized. If preparation takes more than 2-3 hours, the work surfaces must be cleaned and sanitized during that period. One must work rapidly to shorten the time during which ingredients remain at room temperature.

Procedures for the sanitary handling of foods in the preparation area are:

General Procedures for All Areas

1. Keep hands and fingers out of food; do not taste food with fingers. Use a clean tasting spoon each time.
    a. Obtain two teaspoons. Use the first spoon to pick up the food to be tasted.
    b. Transfer the food from the first spoon to the second spoon. Taste from the second spoon only. The first is kept clean for reuse.
    c. Taste food from teaspoon away from food being prepared.
    d. If necessary to retaste, obtain another teaspoon and use same procedure.
2. Use utensils for preparing food as much as possible to avoid direct contact of hands with food. Use tongs, spoons, forks, and plastic gloves for handling ice, butter, rolls, pastries; mixing salads; and shaping meat and fish patties. Be certain the utensils are sanitized
3. Observe no gum chewing, no smoking, and excessive talking rules in food preparation area. The reason is that saliva droplets fall out on the food being prepared and contaminate it with streptococcus bacteria.
4. It is dangerous for prepared foods or foods not cooked to come in contact with soiled or unclean surfaces. This causes cross contamination.
5. All foods whether fresh or cooked must be tightly covered at all times to protect them from contamination.

6. Opened metal cans must not be used or reused for storage since metals combine with foods contained in them and cause contamination. Poisonous metals in the cans are antimony, zinc, cadmium, and lead.

7. All work tables, benches, racks, cutting boards, and food preparation equipment must be completely dismantled, cleaned, and sanitized with a disinfectant or germicide to kill the bacteria that may be present before being used in preparation of other foods.

8. Food utensil surfaces must be checked for corrosion, pitting, cracks, or bending since these are desirable places for bacteria to live and thus are potential sources of food contamination.

9. Cabinets, work tables, and countertops used in food preparation must be free of cracks and crevices since bacteria live in these places and contaminate prepared food.

10. All foods, whether prepared or raw, must be protected from dust, dirt, insects, rodents, sneezes, coughs, and saliva droplets.

11. Food preparation areas must be limited to the people assigned to work at them in order to avoid cross contamination.

12. Clean up food particles, sugar, and grease immediately to prevent bacteria from growing and infestation from insects and rodents.

13. Employees who have colds, upset stomachs, diarrhea, fever, sore throat, infection, cuts, or open sores should stay home. These problems cam result in customer and co-worker illness due to infection of staphylococcus, streptococcus, or perfringens bacteria. Persons recuperating from an illness should be given jobs in which they do not come in contact with clean dishes or foods. An example would be the dish area--putting unclean dishes into the dishwasher; not unloading them after cleaning and sanitizing. Cuts and open sores must be covered with clean bandages or band aids with rubber gloves over them, if on the hands.

14. Use only clean cloths in the food preparation area. Do not use cloths that have touched arms, shoulders, neck, or head.

15. To avoid bacterial growth, food should be served immediately after being prepared. Hold hot foods between 140-165°F and cold foods below 45°F.

16. Total accumulated exposure time within the danger zone of 45°F and 140°F, including preparation and service time, must never exceed four hours.

17. Fingers and hands must be kept away from mouth, lips, face, hair, and soiled surfaces at all times during food preparation.

18. When cleaning counters and working surfaces of food particles and soil, wipe towards yourself into a pan or dish. Do not wipe particles onto the floor. It only makes your cleanup job twice as hard and leaves an unclean appearance.

19. Plan food so there are few leftovers because excess leftovers are

wasteful and bacteriologically dangerous. Leftover foods have been handled more than freshly prepared foods and are likely to be near the maximum accumulated exposure time. Leftovers must be refrigerated immediately and should not be refrigerated more than 24 hours. If they cannot be used within this period, they can be frozen to be used in the near future. A label should indicate type of food and freezing date. It is important to handle leftovers properly. General guidelines for handling specific foods include:

a. Keep the length of time food is to be held at room temperature short.
b. Avoid holding sliced cooked meat from lunch until evening meal either in warming unit or unrefrigerated.
c. Some bacteria thrive on salt. Ham or other salty meat should not be held at room temperature.
d. Do not partially cook turkey or other kinds of poultry and hold in oven or at room temperature for several hours or overnight. This partial cooking of poultry can make bacteria multiply at a rapid rate during storage. The longer they multiply, the harder they are to destroy.
e. Do not use broth, gravy, or dressing that has been held overnight without refrigeration.
f. Do not defrost shrimp or other seafood by holding in water overnight.
g. Do not allow cream pies, puddings, or eclairs to be exposed to room temperature for more than two hours.

20. Procedures for sanitary garbage disposal are of utmost importance in a food service operation, and the following requirements must be met.

a. Garbage containers must be of durable materials which do not leak or absorb liquids.
b. Plastic bags must be put into all garbage cans daily prior to starting work.
c. The number of garbage containers depends on the amount of garbage the food service operation has between collections.
d. Cans kept outside must sit on a rack. Covers must be tight-fitting for the cans. A cool or refrigerated garbage room prevents rapid decay of the garbage and bad odors.
e. Replace lids on garbage containers each time garbage is put in cans.
f. Clean up all spills as they happen and collect garbage frequently.
g. Report any insects or rodents to teacher/manager.
h. Mechanized garbage disposals are helpful in reducing the amount of garbage.
i. After cans are emptied, they must be thoroughly cleaned and sanitized inside and out, using brushes, detergent, and plenty of hot water. A disinfectant must be used to sanitize the garbage containers. In large food service operations, steam cleaning is used.

Procedures for Entree Preparation Area

1. Wash poultry thoroughly shortly before cooking. Use lukewarm water followed by a cold rinse. Drain well. The body cavity could contain salmonella food poisoning. If items are not to be cooked immediately, keep them chilled until cooking time.

2. After cleaning poultry, the sinks, counter surfaces, and equipment used in preparation must be cleaned and sanitized before any other food comes in contact with the work surfaces and equipment.

3. Handle meat, fish, egg, and milk products properly since these foods can be very dangerous sources of food poisoning. Prepare them as close to serving time as possible. Prepare only the amounts needed. If any of these foods are used separately or in combination with sauces, gravies, or mayonnaise, they must be refrigerated to prevent contamination.

4. The interior temperature of large portions of foods can only be verified by using a meat probe thermometer. It registers the exact temperature by being inserted into the center of the food.

5. Shallow pans no more than 4 inches deep should be used for storing these foods. The foods and pans must be cooled as quickly as possible. Single layers must be stored separately and not stacked.

6. When reheating a food, it is necessary that all of it be heated thoroughly. This requires stirring and mixing.

7. Prepared foods should never come in direct contact with surfaces used for raw meat handling.

8. Remove heavy wrapping paper from foods that are to be refrigerated because paper tends to keep cold air away from the food. This keeps the food warmer and makes it a better place for bacteria to grow. Foods wrapped in heavy paper or containers may take on the taste of these wrappings.

9. Meat, especially hamburger, steaks, and roasts which have been cooked to the rare stage, should not be held at room temperature for more than 30 minutes. These products have large surface areas and are easily contaminated.

10. Pork roasts and partially cooked and uncooked hams must be baked or cooked to an internal temperature of 160°F or 71°C. Any other pork cuts must be cooked until well done. They must be gray on the inside and not pinkish. Cooking pork to well done is sufficient to destroy the trichina parasite.

11. Cook poultry dressing in a separate pan. The internal temperature of the meat and the dressing temperature may not be high enough to destroy bacteria (salmonella) before the meat is done. When cooked inside poultry, the dressing remains at a temperature which is ideal for growth of bacteria.

12. Heat creamed items quickly and thoroughly. Danger exists when cold and solid ingredients are added to a cream base or gravy. The cold items may cool the hot products enough to provide a good place for bacteria to multiply. It is necessary that this combined mixture be reheated immediately to 165°-170°F. Leftover creamed items stored for no longer than 24 hours need to be reheated to the same temperature.

13. When using eggs, break each egg into a small dish and inspect for signs of spoilage. Discard suspected eggs.

Procedures for Pantry Area

1. Take extra precautions when making sandwiches or salads from potentially dangerous foods such as eggs, meat, fish,and milk products - especially in a combination with mayonnaise. Be sure the ingredients for salads or sandwiches have been kept cold until preparation time.

2. Mix part of mayonnaise or salad dressing made with an acid (lemon or vinegar) base into potentially hazardous ingredients immediately after the mixture is made. The acid slows down the growth of bacteria. However, the salad must be immediately refrigerated and held chilled before and during serving time.

3. Wash all fresh fruits and vegetables thoroughly before serving raw or before cooking. Use lukewarm running water. Wash fresh greens thoroughly to remove every piece of dirt. Rinse washed products with cold running water and drain. In case of suspected insect infestation, soak fresh vegetables in cold, salted water for 20 minutes. Salt will cause the insects to rise to the top of the water. Fruits such as berries must be washed through in at least three waters to completely clean them. Chemical residues from sprays can also contaminate fresh fruits and vegetables.

4. Foods displayed on a salad cart or salad bar must have a sneeze guard to protect them from contamination by the customer.

5. When using eggs, prevent pieces of shells from falling into the mixture. Break each egg into a small container to check for spoilage.

6. Place finished sandwiches on shallow trays no more than 3-4 inches high. When possible, use acidic foods to discourage bacterial multiplication. Place pickle, salad dressing, mayonnaise, prepared mustard,or horseradish. next to meat or other hazardous fillings. Chill finished products rapidly and keep in cooler or refrigerator until served. If catered, put the date of preparation on sandwiches. Use all sandwiches within 24 hours. Sandwiches can be frozen if the contents do not include mayonnaise, eggs ,or pickles.

7. Hot sandwiches should be thoroughly heated or made with thoroughly heated ingredients.

Procedures for Bakery Area

1. Bins and containers must be emptied, cleaned and sanitized each time before being refilled with the same foods, such as flour and sugar, to prevent contamination.

2. Thoroughly cook custard pie fillings from raw ingredients. If preparing pie filling from a mix, be sure that eggs and milk have been pasteurized. Finished products must be refrigerated until time to serve. If the cream filling is to be used for pies, it should be placed in the baked shell immediately while still hot so that the meringue can be placed on a hot filling. Meringue should be browned immediately at a temperature of 350°F for approximately 16 minutes. Brief heating at a high temperature results in undercooking of the lower portion of meringue. If eggs used are cracked or dirty, salmonella bacteria could enter the egg and be present in the

uncooked meringue. If frozen or dried eggs are used they must be pasteurized.

3. Rolls or bread left on the tables from serving must be discarded. If any of these are left in the warmer after serving, they may be used for crumbs, dressing, or croutons, whichever is appropriate.

4. Do not use canvas for rolling out pastries. Great for contamination! Use smooth working surface that can be cleaned and sanitized.

5. Fillings, puddings, and custards must be at 45°F (7°C) or colder within one hour after preparation. They must be cooled by using cold water around the pan and agitation, or stored immediately in shallow pans in refrigerator or cooler. All must be used within 24 hours.

Bacteria are everywhere. No matter how clean we are or how carefully we handle food, some bacteria are present. This means that we must practice good personal hygiene and sanitation procedures and keep foods under conditions that bacteria dislike and do not find favorable to growth.

SKILL BUILDER

WORDS TO KNOW

Directions:

Match the letter of the correct definition with the correct word.

1. Accumulated ______
2. Bacteriology ______
3. Corrosion ______
4. Crevices ______
5. Cross Contamination ______
6. Disinfectant ______
7. Dismantled ______
8. Exposure ______
9. Germicide ______
10. Infestation ______
11. Perfringens ______
12. Poisonous ______
13. Probe ______
14. Salmonella ______
15. Staphylococcus ______
16. Streptococcus ______
17. Toxin ______
18. Trichina Parasite ______

A. Pollution of clean, wholesome food with illness-producing bacteria which comes from raw foods, soiled hands, work surfaces, equipment, utensils, clothing, etc.

B. Can make sick or kill because of some deadly quality or substance.

C. Completely taken apart.

D. A chemical agent used to inhibit the growth of, or to destroy, harmful microorganisms.

E. A narrow split or crack.

F. Caused by toxin forming bacteria among the hardest to kill and likely to be found in protein foods, especially foods that are handled a great deal by careless food handlers that may have infected sores or respiratory illnesses.

G. To be uncovered for any length of time.

H. Dreaded spore-forming bacteria found in the intestinal tract of humans and animals, in soil, and in kitchen dust. They can be present in raw meats and vegetables and are caused by improperly prepared meats and gravies, unrefrigerated foods, or improperly cleaned equipment and cutting boards.

I. An agent used for killing bacteria.

J. The act of eating or wearing away by chemical action.

K. Extensive contamination by bacteria, insects, or rodents.

L. Collecting or gathering of bacteria on a food, a piece of equipment, work surface, utensil, person,or other thing.

M. To examine by a slender instrument in order to check temperatures of foods.

N. A worm that is present in undercooked pork meat.

O. Bacteria that may be spread by people, animals, or insects to raw or improperly cooked, unrefrigerated, or uncovered food through dirty or unsanitary methods.

P. The study of microorganisms that potentially pose a danger to consumers through foodborne diseases.

Q. Bacteria that are found in food which has been infected by a person that has the disease or is a carrier of that disease.

R. Poisonous compounds found in contaminated food.

SKILL BUILDER

FOODBORNE ILLNESSES

Directions:

Collect articles reporting foodborne illness. Contact the local public health agency for their reports. Summarize the most common sources of serious food poisoning.

SKILL BUILDER

ILLNESSES CAUSED BY CONTAMINATED FOODS

Directions:

Cut out pictures of three food items easily contaminated. Chart a) the kind of contamination that might affect them, b) causes, c) symptoms of illness, and d) measures of prevention.

SKILL BUILDER

FOOD HANDLING PROCEDURES

Directions:

Develop charts to be used in each preparation area to check that correct food handling procedures are being used.

a bird's eye view

SAFETY PRECAUTIONS WITH ELECTRICITY

Understand this science concept:

Metals and water are good conductors of electricity. Glass, porcelain, cotton, rubber, dry wood, and plastic do not conduct electricity.

Teacher Materials

Information Sheet
Sample Lesson Plan

Student Materials

Assignment Sheet:	Use Safety Precautions with Electricity
Information Sheet:	Electricity
Skill Builders:	Words to Know Checklist for Electrical Wiring Experiment on Conductors

TEACHER INFORMATION SHEET

Understand this science concept:

Metals and water are good conductors of electricity. Glass, porcelain, cotton, rubber, dry wood and plastic do not conduct electricity.

Have you ever walked over a carpet and then touched another person or touched a doorknob only to have a spark of electricity appear? You rub electrons off the rug and you collect extra electrons. When you touch another person who doesn't have extra electrons, some of your extra electrons rush to that person or the doorknob causing a spark and feeling a shock. Rapid movement of electrons causes the shock, spark, and crackling noise that you sometimes feel, see, and hear. You feel a shock because a stream of electrons passes through your fingers. The movement of electrons from one place to another is an electric current.

Electricity is related to electrons. When electrons are removed from an object, such as wool, and collected by an object such as a plastic comb, this collection of electrons on an object is static electricity. Static means not moving. When electrons move from one place to another this movement is current electricity. Current means moving.

When you collect electrons you are said to be "charged" with static electricity. When you touch another person or metal you become "discharged" and the electrons leave you. A spark may occur as you are discharged. A spark and a lightning flash are the same sort of thing. They are streams or lines of electrons moving from one place to another. A cloud can become charged with a large amount of static electricity. When the cloud discharges, the spark may be huge. It is a flash of lightning. The stored-up electrons in the cloud move with great speed to another cloud or to the ground. You charge yourself with electricity by scuffing your feet on a rug. You discharge yourself by touching a metal object such as a doorknob or radiator. If you had touched a piece of dry wood, which is a non-conductor, you would not have discharged. Some substances let electrons travel through them better than others.

Rubbing two objects together and using the charged object to produce a flow of electrons is not very useful. This method produces very small amounts of electricity. In order to obtain adequate amounts of electricity to run equipment, electrical current has to be generated. The electrical current generated produces the force necessary to light lights, run equipment, etc.

One must be aware that electricity starts its journey at the generating plant.

The main part of the plant is the generator. Voltage is generated in 115/230 volts or 120/240 volts. In order for current to flow the wires must be good conductors. Copper and aluminum are commonly used. Metals in general are relatively good conductors. Water is also an excellent conductor of electric current. In contrast, insulating materials do not let electrons pass easily. Insulating materials are made of glass, porcelain, cotton, silk, rubber, and dry wood.

Insulators are used to keep conductors in place on high line poles, to protect circuit wires in the homes from contact with flammable materials, and to prevent short circuits.

SAMPLE LESSON PLAN

Science Concept: Safety - Electricity
Task: Use Safety Precautions with Electricity

Objective: The student will be able to:

1. Explain how static electricity is created
2. List safety precautions to follow when using electricity
3. Evaluate a facility for electrical safety

Teaching Aids:

Comb
Brush
Sheet of Paper
3 Balloons
String
Glass of Water
Supplies for Experiment on Conductors

I. Preparation of the Learner:

Uncontrolled electricity is a very dangerous commodity. Consequently, one must understand the nature of electricity, how it travels, and what precautions should be observed when using electricity.

II. Presentation:

CONCEPT	CLASSROOM ACTIVITIES
Electrons	Scientists have found that electrons in an atom carry a tiny bit of electricity. Matter is made up of atoms; these atoms have electrons around them. Electrons can move. A wool cloth and a plastic rod or comb can move electrons easily. When you rub a plastic comb against wool, conditions become right for the electrons to be set in motion. In this process some of the electrons in the wool are rubbed off of the wool and collected on the comb. The comb collects some extra electrons. Any item that collects extra electrons attracts items that lack extra electrons. Demonstration: Tear some tissue paper into small pieces.

II. Presentation:

CONCEPT	CLASSROOM ACTIVITIES
Static Electricity	1. Hold brush or comb next to a small pile of paper. Is the paper attracted to the comb or brush? 2. Brush and comb someone's hair briskly. Hold the brush or comb near the paper. Is the paper attracted to the comb or brush? Demonstration: 1. Blow up a balloon; tie it's neck securely. 2. Without using anything else (no tape, paste, staples, etc.) stick the balloon on the wall. 3. Ask the students to explain the scientific principle involved. Demonstration: 1. Blow up two balloons, tie tightly; leave 12" of string on each balloon. 2. Hang them up side by side or hold them together by the strings. 3. Rub both balloons with a wool cloth. Ask the students to explain when both balloons were charged. Demonstration: 1. Rub a glass of water with a wool cloth. 2. Did you charge the glass? Explain why or why not.
Electrical Conductors and Electricity	Complete the activity - Experiment on Conductors.

III. Application:

Have students complete Skill Builders individually on Student Assignment sheet.

IV. Evaluation:

Complete the following quiz by circling the correct ending for each statement.

1. A plastic comb rubbed with wool attracts bits of paper because it is:
    - a. magnetic
    - b. charged with electrons
2. When plastic is rubbed with wool
    - a. the plastic gains electrons
    - b. the wool gains electrons
3. An object that has collected extra electrons and one with no extra electrons will
    - a. attract each other
    - b. not attract each other
4. Electricity is a flow of
    - a. atoms
    - b. electrons
5. TRUE OR FALSE (Circle one). Electrons gathered on an object cannot be removed.
6. TRUE OR FALSE (Circle one). A transfer of electrons from one object to another gives one object a charge of extra electrons.

ANSWER KEY

1. b) charged with electrons
2. a) the plastic gains electrons
3. a) attract each other
4. b) electrons
5. False
6. True

ASSIGNMENT SHEET

Science Concept: Safety - Electricity

Task: Use Safety Precautions with Electricity

Why learn this?

Electricity is essential for lighting, operating equipment, and giving treatment. Hence, anyone that works with electrical appliances and equipment must have an understanding of its dangers. Practical safeguarding of persons, buildings, and property from electrical hazards is important at all times.

Principle Emphasized:

Metals and water are good conductors of electricity. Glass, porcelain, cotton, rubber, dry wood and plastic do not conduct electricity.

Words to Know:

Atom
Charge
Circuit
Conduct
Current
Discharge
Electricity
Electrons
Energized
Generate
Generator
Insulate
Manual
Octopus Adapter Plug
Overload
Shock
Static
Voltage

Resources: Information Sheet - Electricity

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1. Read the resources
2. Complete Skill Builder - Words to Know
3. Complete Skill Builder - Checklist for Electrical Wiring

INFORMATION SHEET

ELECTRICITY

Safety Precautions with Electricity

Electrical malfunctions cause more fires than anything else.

EMPHASIS - Remove all electrical cords by grasping the plug instead of jerking the cord.

EMPHASIS - Unplug cords from the wall socket first before removing extension cords or cords from appliances.

EMPHASIS - Always have dry hands when touching anything with electrical current flowing through it.

EMPHASIS - Never stand in water or have wet feet when removing electrical cords or operating electrical equipment.

EMPHASIS - Never overload lines by using octopus adaptor plugs.

EMPHASIS - If you ever observe a frayed electrical cord, report it to your immediate supervisor (boss).

On every building there is an electrical panel. It is usually at the point where the outside wiring first enters. In case of an emergency, such as lightning striking, a fire breaking out, or a tornado hitting, turn to off or pull the main fuses to stop all electrical current from entering the building.

Look at the high electric lines to see the insulators holding the wires in place. Some underground electrical and telephone lines are in waterproof ducts. Underground lines are marked by stakes with identification in case of trouble with the lines. The utility companies can quickly locate the trouble area.

Purpose of Switches

No matter how big or complex a switch is, it does one thing; it makes a path along which electrons can flow or be blocked. When the way is blocked there is no path for electrons to follow so the current stops.

Switches do the job of starting and stopping electrical current. Electrical lines have fuses or breaker switches to stop the flow of electrical current in case of trouble. For example, in the case of overload where the demand for electricity is more than the lines are capable of handling, a fuse will blow out causing a break. This signals a problem. After the problem is corrected, and the fuse replaced, the flow of energy will continue. Breaker switches have to be manually reinstated or put back to the on position.

Paul B. Grandwein et al., Concepts in Science, (New York, NY: Harcourt Brace Jovanovich, 1975).

Louise J. Peet, Science Fundamentals, (Ames, Iowa: The Iowa State University Press, 1972).

Occupational Safety and Health in Vocational Education, U.S. Department of Health, Education and Welfare, (Cincinnati, Ohio: Robert A. Taft Laboratories, 1979).

SKILL BUILDER

WORDS TO KNOW

Directions:

Study the following list of words and make up a test for the class. Turn in your suggested test with an answer key to the instructor. The instructor has the option toselect one of the tests to give to the class at a later time.

You may want to test yourself by matching each word with the appropriate definition.

a. Electrons
b. Conduct
c. Octopus Adapter Plug
d. Electricity
e. Discharge
f. Atom
g. Voltage
h. Static
i. Generator
j. Energized
k. Charge
l. Manual
m. Shock
n. Current
o. Generate
p. Insulate
q. Overload
r. Ciccuit

1. ________________ A building block of elements; combine to form molecules
2. ________________ Tiny negatively charged particle revolving around the nucleus of an atom
3. ________________ An accumulation of electricity as on a cloud or a rubbed hair comb
4. ________________ Flow of electricity in a conductor
5. ________________ Adaptor plug with more than one place to plug into
6. ________________ Produce
7. ________________ Path followed by an electric current
8. ________________ To put forth energy, to act, to make vigorous
9. ________________ Not moving
10. ________________ Unload, give off
11. ________________ Protect with a material to prevent the loss of electricity
12. ________________ Transmit electricity
13. ________________ Done by hand
14. ________________ Field of force possessing potential energy
15. ________________ Electromotive force shown in volts
16. ________________ Painful effect of electrical current on the body
17. ________________ Machine for changing mechanical into electrical energy
18. ________________ Too much, excessive load carried

Key: 1)f, 2)a, 3)k, 4)n, 5)c, 6)o, 7)r, 8)j, 9)h, 10)e, 11) p, 12)b, 13)l, 14)d, 15)g, 16)m, 17)i, 18)q

SKILL BUILDER

CHECKLIST FOR ELECTRICAL WIRING

Directions:

You will need two copies of this checklist. Inspect the community and home lab area and check the appropriate column. Take the second copy home and ask your parents to go through the checklist with you to check the safety of your home.

	YES	NO
1. Have exposed wires, frayed cords, and deteriorated insulation been repaired or replaced?		
2. Are flexible cords and cables not attached to building surfaces?		
3. Are electrical equipment controls accessible?		
4. Are all conduit connections intact?		
5. Do all extension cords being used have a ground wire?		
6. Are all extension cords in use of appropriate wiring to carry the current being drawn?		
7. Are multiple plug adaptors not used?		
8. Are junction boxes, outlets, switches, and fittings covered?		
9. Is all metal fixed electrical equipment grounded?		
10. Are flexible cords and cables fastened so that there is no direct pull on joints or terminal screws?		
11. Are flexible cords and cables never substituted for fixed wiring?		
12. Do flexible cords and cables not run through holes in walls or ceilings, doorways or windows?		
13. Do flexible cords and cables have properly executed splices or taps?		
14. Does all equipment connected by cord and plug have grounded connections?		
15. Are electrical appliances such as vacuums, polishers, and mending machines grounded?		
16. Are all portable electrical hand tools grounded?		
17. Are breaker switches identified as to their use?		

SKILL BUILDER

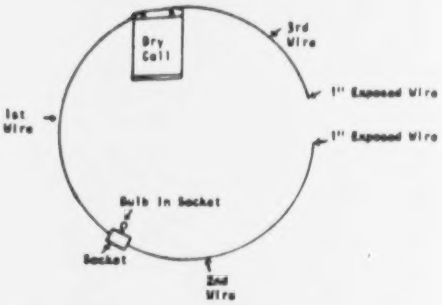
EXPERIMENT ON CONDUCTORS

Supplies and materials:

1 1/2 volt dry cell
1 1/2 volt flashlight bulb
1 light bulb socket
3 15" insulated wires with 1" of the insulation removed from each end
1 piece of wood (block)
1 metal key
1 porcelain chip
1 cotton ball
1 rubber cork
1 plastic lid
aluminum foil
hair
cardboard

Directions:

Connect the dry cell, bulb, and socket with the three wires as shown below:



1. Hold on to the insulated part of the wire. Does the light bulb light if the two loose ended wires do not touch?

2. Touch the bare wires together. Does the bulb light?

3. Lay the metal key on the table and touch one bare wire to one end of the key, and the other bare wire to the other end of the key. Does the bulb light? Is the metal key a good or a poor conductor of electrical current?

4. Continue the experiment using the following and determine which items are good conductors (lights the bulb) and which are poor conductors (do not light the bulb):

Wood
Porcelain
Cotton
Rubber Cork
Plastic Lid
Aluminum Foil
Hair
Cardboard

5. What is a ground wire? What is the purpose of it?

a bird's eye view

SAFETY WITH CHEMICALS

Understand these science concepts:

Elements are substances that cannot be separated into different substances.

Chemicals are various combinations of elements. Chemicals react with one another when combined.

Teacher Materials

Information Sheet
Sample Lesson Plan

Student Materials

Assignment Sheet:	Safety and Comfort
Information Sheet:	Chemical Reactions with Everyday Products
Skill Builders:	Words to Know Safety with Chemical Reactions

TEACHER INFORMATION SHEET

Understand these science concepts:

Elements are substances that cannot be separated into different substances.

Chemicals are various combinations of elements. Chemicals react with one another when combined.

Chemicals, in themselves, are not dangerous, but harmful chemical reactions can occur through ignorance and carelessness in mixing them.

The purpose of studying safety with chemical reactions is to protect yourself by the prevention and control of injuries and health hazards.

Elements are substances that are basic and cannot be separated into different substances. Chemical reactions occur when elements are combined. Cleaning agents are chemical in nature.

Proper handling of chemicals should be adopted by every employee in order to reduce chemical hazards. A very important point is to limit or avoid contact with chemicals as much as possible.

1. Prevent direct skin contact
2. Prevent inhaling vapors
3. Prevent inhaling dusts
4. Prevent inhaling mists
5. Prevent ingestion

All employees must be aware of and thoroughly understand:

1. Good personal hygiene: wash exposed skin surfaces immediately, change contaminated clothing and shoes

2. How to use personal protective equipment: safety glasses, aprons, safety shoes

3. Physical characteristics of the chemicals you use; their possible reactivity with other substances

4. Overexposure symptoms, effects, toxic properties

5. Proper techniques and practices for handling chemicals

6. Proper techniques for storing chemicals

7. Proper techniques for mixing chemicals

8. Proper disposal of hazardous chemicals
9. Combustability of the chemical substance
10. Correct emergency procedures to follow in case of contamination

Mechanical exhaust ventilation systems are used to control air contaminants which are potential health hazards. Danger of inadequate ventilation not only contributes to health problems but also to possible fire hazards.

Summary

In order to determine the chemical content of substances you may have to use and read labels thoroughly. Pay particular attention to CAUTIONS on labels. People react to chemicals differently. Some skin is more sensitive, so consequently, exposure levels vary before damage occurs.

Hospital Research and Educational Trust, *Being a Housekeeping Aide*, (Bowie, Maryland: Robert J. Brady Company, 1977).

U.S. Department of Health, Education, and Welfare, *Occupational Safety and Health in Vocational Education*, (Cincinnati, Ohio: Robert A. Taft Laboratories, 1979).

SAMPLE LESSON PLAN

Science Concept: Safety with Chemicals
Task: Use Safety Precautions with Chemicals

Objective: The student will be able to:

1. Explain diffusion and saturation when mixing solutions
2. Name hazardous products and their effects

Teaching Aids:

2 Glasses of Water, 2/3 Full
Salt
Food Coloring
Chemical Reactions with Everyday Products Chart

I. Preparation of the Learner:

For the personal safety and welfare of you, the employee, as well as the people you will come in contact with on the job, you must understand the dangers of chemical reactions.

II. Presentation:

CONCEPT	CLASSROOM ACTIVITIES
Diffusion and saturation	Experiment: Set the two glasses with water on a table in the front of the class. Slowly add salt to one glass stirring constantly until a thin layer of salt crystals settle out in the bottom of the glass. This is a saturated solution. In the second glass of water drop one drop of food coloring. Have students observe how the coloring begins to diffuse. Then add two drops of coloring and stir gently illustrating how the substance becomes mixed. In conclusion, when too much of a substance is used,it is a waste economically and, in some circumstances, it will cut down the efficiency of the mixture. More does not make better. In some situations, if too high a concentration is used, it could irritate the skin and respiratory system.

II. Presentation:

CONCEPT	CLASSROOM ACTIVITIES
Hazardous chemical materials and processes	Game: Prepare two copies of the Chemical Reactions with Everyday Products Chart for each student. Have students cut apart the chart. Students may prefer to work in couples. Match the name, the description and the effect. The second copy of the chart will be needed to check the matching for accuracy.

III. Application:

Have students individually complete Skill Builders on Student Assignment Sheet.

AND

Have fish bowl contest with entire class after all students have completed the Skill Builder - Words to Know.

ASSIGNMENT SHEET

Science Concept: Safety with Chemicals

Task: Use Safety Precautions with Chemicals

Why learn this?

Descriptions - Basic understanding of how chemicals behave and react is essential for every area whether it is related to housekeeping skills, patient care, sanitation and disinfecting, food preparation, or laundry.

Principle Emphasized:

Elements are substances that cannot be separated into different substances.

Chemicals are various combinations of elements. Chemicals react with one another when combined.

Words to Know:

Abuse
Absorbent
Asphyxia
Behavior
Calamity
Caustic
Chemical
Chemistry
Combustible
Concentration
Contaminate
Corrosive
Detergent
Diffuse
Dilute
Dilution
Dust
Element
Fumes
Ingestion
Irritant
Misuse
Mix
Mixture
Narcotic
Physical Action
Saturate
Saturation
Substance
Solution
Solvent
Toxic
Vapor

Resources: Information Sheet - Chemical Reactions with Everyday Products

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1. Read the resources
2. Complete Skill Builder - Words to Know
3. Complete Skill Builder - Safety with Chemical Reactions

INFORMATION SHEET

CHEMICAL REACTIONS WITH EVERYDAY PRODUCTS

NAME	DESCRIPTION	EFFECT
Ammonia	Colorless liquid or gas Characteristic odor Sharp taste Used as a cleaning agent Used as a refrigeration gas	Skin contact results in burns Vapors irritate the eyes, throat, and lungs
Carbon Dioxide	Colorless, odorless gas	An asphyxiant Replaces oxygen in the blood Causes increase in breathing rate, shortness of breath, dizziness, vomiting
Carbon Monoxide	Tasteless, odorless gas Poisonous	Causes unconsciousness and death in a matter of minutes
Caustics & Corrosives	Sodium hydroxide Acids	Skin contact results in severe burns
Chlorine	Liquid, powder, granulated, or gas	Irritates eyes, nose, throat, lungs Burns skin
Drain Cleaners	Commercial cleaning agents	Causes skin burns Injurious to eyes
Heat and Cold	Exposure to extreme high and low temperatures	Fatigue, discomfort Job inefficiency Collapse

NAME	DESCRIPTION	EFFECT
Dermatitis	Acids, alkalies, solvents and some oils are primary irritants	Disorders range from itching and rashes to severe blistered and cracked skin
Hydrogen	Explosive gas	Explosive atmosphere
Insecticides	Compounds of toxic chemicals	Illness caused by inhaling dusts, mists, liquid vapor, direct skin contact, and ingestion
Solvents	Thinners	Narcotic (nervous system) long term exposure may cause irreparable liver, lung, blood, kidney, and gastrointestinal damage Skin rashes, dermatitis
Flammable Liquids	Gasoline, acetone, lacquer, and thinner	Burn
Combustibles	Kerosene, fuel oil, solvents	Burn

SKILL BUILDER

WORDS TO KNOW

Directions:

Use the dictionary to look up each word. Divide the words into syllables. Record the properly divided word on the blank provided. Add pronunciation marks to help you learn how to pronounce each word. After you complete dividing the words, study definitions in preparation for a fish bowl contest in class.

1. Abuse
2. Absorbent
3. Asphyxia
4. Behavior
5. Calamity
6. Caustic
7. Chemical
8. Chemistry
9. Combustible
10. Concentration
11. Contaminate
12. Corrosive
13. Detergent
14. Diffuse
15. Dilute
16. Dilution
17. Dust
18. Element
19. Fumes
20. Ingestion
21. Irritant
22. Misuse
23. Mix
24. Mixture
25. Narcotic
26. Physical Action
27. Saturate
28. Saturation
29. Substance
30. Solution
31. Solvent
32. Toxic
33. Vapor

____________________________ To use wrongly, improperly

____________________________ Ability to absorb, suck in, engulf

____________________________ To sufficate, deficiency of oxygen and excess of carbon dioxide in the blood

____________________________ Manner of acting

____________________________ A great misfortune, disaster

____________________________ Corrosive

____________________________ Substances

____________________________ Science dealing with composition and reactions of substances

____________________________ Inflammable

____________________________ Of a solution, the relative content in dissolved material, strength

____________________________ Substance polluting, make impure

____________________________ Wear away

____________________________ Cleaning substances

____________________________ Spread out, widespread

____________________ To make thinner, to diminish in strength

____________________ State of being diluted

____________________ Finely powered matter

____________________ Basic part

____________________ Offensive smoke or vapor

____________________ To take in

____________________ Any substance or agent which irritates or inflames

____________________ Wrong use, misapply

____________________ To unite or blend

____________________ A preparation consisting of two or more ingredients

____________________ Drug causes deep sleep, lessens pain

____________________ Change without chemical reactions (For example: scraping, friction, suction)

____________________ Completely penetrated, impregnated, soaked

____________________ A point where no more can be dissolved or absorbed

____________________ Material of which a thing is made

____________________ A liquid containing a dissolved substance

____________________ A substance capable of dissolving something

____________________ Poisonous

____________________ Any diffused matter suspended in the air

SKILL BUILDER

SAFETY WITH CHEMICAL REACTIONS

Directions:

To understand the importance of following instructions on labels and thoroughly mixing solutions, perform the following experiment on saturation and diffusion.

Remember the importance of diluting and mixing agents according to directions so they can achieve maximum performance and stay within safe limits.

Plan a lab activity to practice making saturated solutions. Properly mix mixtures or substances to make certain they are dissolved. The lab practice should be done at each individual station. Examples could be the following: housekeeping, food prepartion, laundry, health aide, child care, or therapeutic recreation.

Depending upon the individual laboratory facility, the following are suggested possibilities.

Housekeeping	-	Cleaning disinfectant Cleaning compound
Food Preparation	-	Simple syrup Dissolve sugar in tea or coffee Chocolate syrup in a glass of milk
Laundry	-	Dissolve detergents in water
Health Aide	-	Aseptic solution
Child Care	-	Diffusing coloring through play dough
Therapeutic Recreation	-	Mix paints

a bird's eye view

SELECTING A WELL-BALANCED DIET

Meeting nutritional needs through daily food selection.

Teacher Materials
Information Sheet
Sample Lesson Plan

Student Materials

Assignment Sheet: Meeting Nutritional Needs
Information Sheets: Nutrition Density Charts
Skill Builders: Nutrition Word Puzzle
Nutrition Questions
Diet Analysis
Planning a Daily Menu

TEACHER INFORMATION SHEET

Understand this science concept:

Meeting nutritional needs through daily food selection.

From infancy, eating is connected to a feeling of love, comfort, and well-being or of discomfort and unhappiness. People's attitudes toward food are established early and are influenced by others. Very young children learn that refusing food is a way to "control their lives." Parents often reward good behavior with sweets. Advertised foods and foods preferred by one's own groups also seem to affect food choice and diet. It appears that nutrition plays only a small part in the foods we choose to eat.

Each day, the body requires a variety of nutrients and other ingredients which nourish the body. Nutrients provide energy, enable the body to grow, heal and repair cells, and carry on vital processes such as respiration and circulation. The following is a list of nutrients, their functions, and the foods which supply them.

CARBOHYDRATES supply energy and provide fiber. Food sources are: fruits, vegetables, breads, cereals, honey, and sugar.

FATS supply energy as well as fatty acids for normal growth and healthy skin. Food sources are: vegetable oils, nuts, avocados, butter, margarine, dairy products, and meats.

PROTEINS build and repair body cells, help fight disease, and supply energy. Food sources are: meat, eggs, fish, poultry, milk, dairy products, dried beans and peas, peanuts, and peanut butter.

MINERALS/CALCIUM help build and maintain bones and teeth, help blood to clot, and help heart, nerves, and muscles work properly. Food sources are: milk, dairy products, green leafy vegetables, canned sardines, and other processed fish eaten with bones.

IRON helps to make hemoglobin so the blood can carry oxygen to cells. It also helps cells to use oxygen. Food sources are: liver, other meats, egg yolks, dried fruit, beans, peas, dark green leafy vegetables, whole grain or enriched breads, and cereals.

Most foods provide more than one nutrient but no food contains all the nutrients in the amounts needed. To nourish the body adequately, a variety of foods must be selected from each food group each day.

The 4 basic food groups are:

1. Milk Group
2. Fruit-Vegetable Group
3. Meat Group
4. Grain Group

FOOD GROUPS AND DAILY REQUIREMENTS

MILK GROUP

whole milk
buttermilk
skim milk
dairy products
  cheese
  sour cream
  yogurt
  ice cream

Birth to 9 years - 2-3 servings
9-12 years - 3 or more servings
Teenagers - 4 servings
Adults - 2 or more servings
Pregnant and nursing women - 4 or more servings

FRUIT-VEGETABLE GROUP

fruit
vegetables
liquid in which vegetables or fruits have been cooked
(use for soups, gravies, stews, or as a beverage)

1 citrus fruit
1 dark green or deep yellow vegetable
2 or more other fruits or vegetables

MEAT GROUP

meat
fish
poultry
milk
cheese
dried beans
peas
nuts, peanuts
peanut butter

2 servings

GRAIN GROUP

whole grain or enriched bread
cereal
rice
grits
cornmeal
enriched pasta
  (such as macaroni and spaghetti)

4 servings

Other foods such as butter, margarine, oil, salad dressing, candies, jams, sugar, syrup, and carbonated beverages contain empty calories and should be used only in small amounts.

HOW MUCH IS A SERVING?

Food Group	1 Serving Equals
Milk Group	1 cup milk or yogurt, 1 1/2 cups cottage cheese, 2/3 cup ice cream, 1 ounce slice American cheese or a 1 inch cube of hard cheese
Meat Group	3 ounces meat, fish, chicken, 2 eggs, 1 cup cooked peas or beans, 4 tablespoons (1/4 cup) peanut butter, 3 slices cheese or 1 cup cottage cheese
Fruits and Vegetables	1/2 cup vegetables or fruits or fruit juices or 1 whole fruit (small)
Breads	1 slice bread, 1/2 cup potato, corn, rice, spaghetti or cooked cereal, 1 cup breakfast cereal, 1 biscuit or muffin
Empty Calories	1 small bag chips, 8 ounce glass of pop, 1 piece of pie or cake, 2 or 3 small cookies, 1 tablespoon jelly, syrup, butter, or margarine

CALORIES

Carbohydrates, fats, and proteins provide heat and energy for the body. This heat and energy is measured in terms of calories. Individual body differences and varying levels of physical activity help to determine calorie requirements, but there are "average" needs which will help to determine appropriate food intake for infants and young children.

Birth to 1 year	1,000 calories per day
1 to 3 years	1,300 calories per day
3 to 6 years	1,600 calories per day

Children should not be served "empty-calorie" foods, foods which are high in calories and low in nutritional value. Empty-calorie foods such as candy, cookies, cakes, soft drinks, artifically flavored drinks, chips, and other munchies, can lead to excessive weight and malnutrition. They also establish an eating pattern which is difficult to overcome. A child who snacks on high calorie foods will not be ready to eat at mealtime but will be ready for another high calorie snack after the meal. This is the beginning of the habit of nibbling which replaces a well-balanced meal.

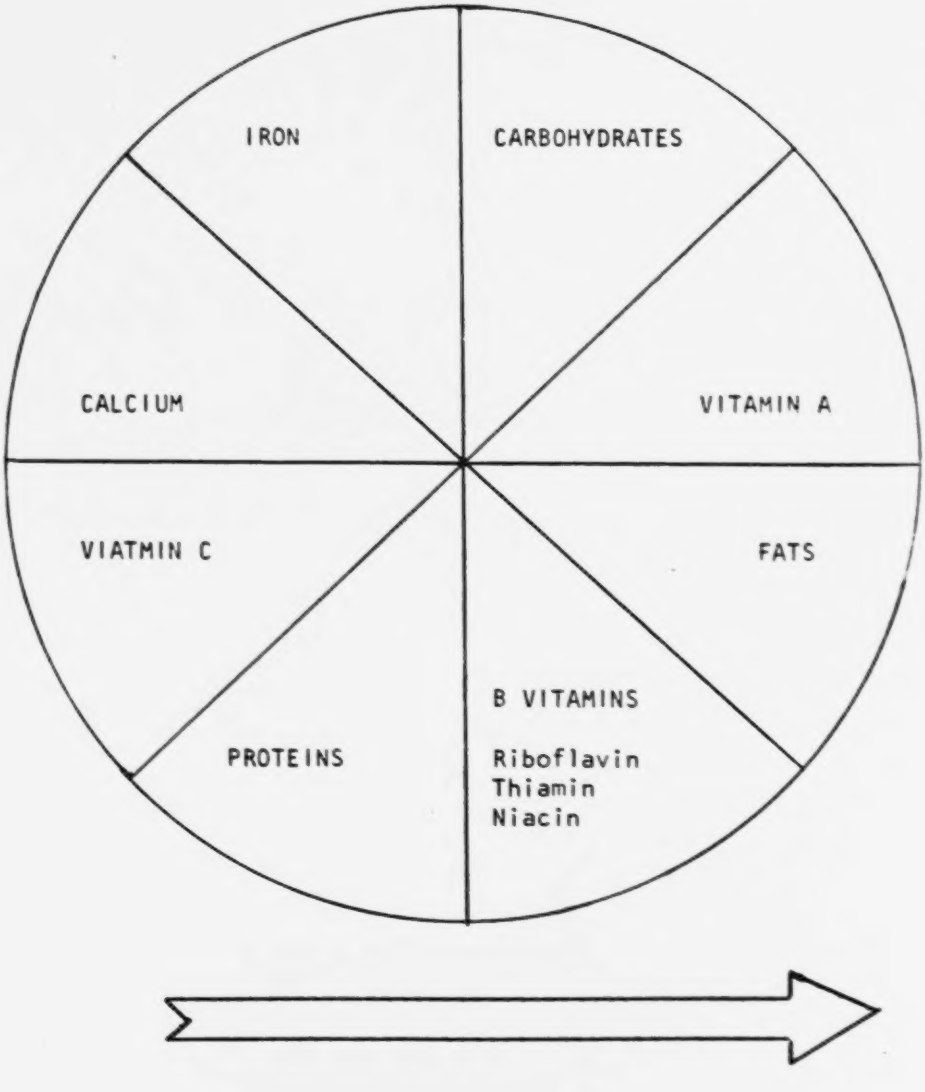
Young children should eat three meals per day plus a mid-morning, mid-afternoon, and bedtime snack. The three snacks should be foods which provide a portion of the children's basic daily food requirements.

In the United States, skipping breakfast is a common habit with unpleasant results. Studies show that people who skip breakfast...

feel cross and tired
have less interest in activities
have more accidents
accomplish less work in the morning

Breakfast should provide the body with a third of the food needs for the day. Breakfast does not have to be traditional. Any food selected from the food groups and daily requirement list can be eaten for breakfast. Give your body a break - eat breakfast.

NUTRIENTS GAME


IRON
CARBOHYDRATES
CALCIUM
VITAMIN A
VIATMIN C
FATS
B VITAMINS
Riboflavin
Thiamin
Niacin
PROTEINS

The nutrients game may be played by two or more people. In this game the player must identify either the food sources which provide the nutrient or the function of the nutrient. One point is earned for each correct answer and the player may continue answering until a wrong answer is given. The game may be timed to enhance excitement.

SAMPLE LESSON PLAN

Science Concept: Meeting Nutritional Needs
Task: Select a Well-Balanced Diet

Objective: The student will be able to:

1. List the function of each nutrient.
2. Determine calorie needs for various age groups.
3. Identify food sources for the various nutrients.
4. Plan menus to meet daily nutritional needs.

Teaching Aids:

Nutrients Game - Teacher Information Sheet

I. Preparation of the Learner:

What does the saying "You are what you eat " mean?
Why is good nutrition so important to the growing child?

II. Presentation:

CONCEPT	CLASSROOM ACTIVITIES
Nutrients	List nutrients on chalkboard and discuss the basic functions of each. Play nutrition game
Basic-Four Food Guide	Introduce the Basic-Four (Five) Food Guide and demonstrate how it can be used to plan daily menus.
Nutrient Density Charts	Explain how to use the Nutrition Density Charts to plan for calorie and nutritional needs.

III. Application:

Have students complete Skill Builders on Student Assignment Sheet individually.

ASSIGNMENT SHEET

Science Concept: Meeting Nutritional Needs

Task: Select a Well-Balanced Diet

Why learn this?

While food preferences vary greatly, body needs are quite similar. In the United States, many people are malnourished although they appear to be of average weight or even overweight. If people are to be physically and mentally healthy, food intake must be based on body requirements, not preference or custom alone. The food you choose for yourself and for preschool snacks will have far-reaching effects on the appearance, disposition, and physical activity of yourself and the children you supervise.

Principle Emphasized:

Meeting nutritional needs through daily food selection.

Words to Know:

Nutrition	Habit
Malnutrition	Fats
Nutrient	Protein
Vital	Iron
Function	Diet
Calorie	Empty Calories

Resources: Information Sheets - Nutrition Density Charts

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1. Read the information sheets.
2. Complete Skill Builder #1 - Nutrition Word Puzzle
3. Complete Skill Builder #2 - Nutrition Questions
4. Complete Skill Builder #3 - Diet Analysis
5. Complete Skill Builder #4 - Planning a Daily Menu

INFORMATION SHEET

NUTRITION DENSITY CHARTS

The milk list (12 g carbohydrate, 8 g protein, 80 kcalories)

Amount	Food
Nonfat Fortified Milk	
1 c	Skim or nonfat milk
1 c	Buttermilk made from skim milk
1 c	Yogurt made from skim milk (plain, unflavored)
1/3 c	Powdered, nonfat dry milk, before adding liquid
½ c	Canned evaporated skim milk, before adding liquid
Low-fat Fortified Milk	
1 c	1% fat fortified milk (add ½ fat exchange)*
1 c	2% fat fortified milk (add 1 fat exchange)#
1 c	Yogurt made from 2% fortified milk (plain, unflavored) (add 1 fat exchange)#
Whole Milk (add 2 fat exchanges)	
1 c	Whole milk
1 c	Buttermilk made from whole milk
1 c	Yogurt made from whole milk (plain , unflavored)
½ c	Canned evaporated whole milk, before adding liquid
Chinese Foods	
1 c	Soybean milk, unsweetened
2 blocks	Soybean curd (2½ x 2½ x 1½ inches)
2/3 c	Soybean, cooked
Fast Foods +	

A milk exchange is a serving of food equivalent to 1 c skim milk in its energy nutrient content. One milk exchange contains substantial amounts of carbohydrate and protein and about 80 kcalories.

*These milk exchanges contain more fat than skim milk. Add one-half fat exchange.

#These milk exchanges contain more fat than skim milk. Add 1 fat exchange.

+These fast foods contain one-half milk exchange and added bread and fat: chocolate shake (3½ bread, 2 fat, 365 kcalories); vanilla shake (3 bread, 1½ fat, 325 kcalories); strawberry shake(3½ bread, 1½ fat, 345 kcalories).

The vegetable list (5 g carbohydrate, 2 g protein, 25 kcalories)

Amount	Food
½ c	Asparagus
½ c	Bean sprouts
½ c	Beets
½ c	Broccoli
½ c	Brussels sprouts
½ c	Cabbage
½ c	Carrots
½ c	Cauliflower
½ c	Celery
½ c	Cucumbers
½ c	Eggplant
½ c	Green pepper
	Greens
½ c	Beet greens
½ c	Chards
½ c	Collard greens
½ c	Dandelion greens
½ c	Kale
½ c	Mustard greens
½ c	Spinach
½ c	Turnip greens
½ c	Mushrooms
½ c	Okra
½ c	Onions
½ c	Rhubarb
½ c	Sauerkraut
½ c	String beans, green or yellow
½ c	Summer squash
½ c	Tomatoes
½ c	Tomato juice
½ c	Turnips
½ c	Vegetable juice cocktail
½ c	Zucchini
	Chinese Foods
½ c	Beansprouts, soy
½ c	Lotus root (1/3 segment)
½ c	Waterchestnut
½ c	Yam bean root

A vegetable exchange is a serving of any vegetable that contains a moderate amount of carbohydrate, a small but significant amount of protein, and about 25 kcalories.

The fruit list (10 g carbohydrate, 40 kcalories)

Amount	Food
1 small	Apple
1/3 c	Apple juice
½ c	Applesauce (unsweetened)
2 medium	Apricots, fresh
4 halves	Apricots, dried
½ small	Banana
½ c	Blackberries
½ c	Blueberries
¼ small	Cantaloupe melon
10 large	Cherries
1/3 c	Cider
2	Dates
1	Fig, fresh
1	Fig, dried
1 half	Grapefruit
½ c	Grapefruit juice
12	Grapes
¼ c	Grape juice
1/8 medium	Honeydew melon
¼ small	Mango
1 small	Nectarine
1 small	Orange
½ c	Orange juice
3/4 c	Papaya
1 medium	Peach
1 small	Pear
1 medium	Persimmon (native)
½ c	Pineapple
1/3 c	Pineapple juice
2 medium	Plums
2 medium	Prunes
¼ c	Prune juice
½ c	Raspberries
2 tbsp	Raisins
3/4 c	Strawberries
1 medium	Tangerine
1 c	Watermelon
Chinese Foods	
1 medium	Guava, fresh
3 medium	Kumquats, fresh
4 medium	Lychee, fresh
½ small or 1/3 c	Mango
½ small or 1/3 c	Papaya
½ medium	Persimmon
1/3 medium	Pomelo
Fast Foods*	

A fruit exchange is a serving of fruit that contains about 10 g of carbohydrate and 40 kcalories. The protein and fat content of fruit is negligible.

*Apple and cherry pies contain 1½ exchanges of fruit but also 1 bread and 3½ fat exchanges.

The bread list (15 g carbohydrate, 2 g protein, 70 kcalories)

Amount	Food
Bread	
1 slice	White (including French and Italian)
1 slice	Whole wheat
1 slice	Rye or pumpernickel
1 slice	Raisin
1	Small bagel
1 half	Small English muffin
1	Plain roll, bread
1 half	Frankfurter roll
1 half	Hamburger bun
3 tbsp	Dried bread crumbs
1 6-inch	Tortilla
Cereal	
½ c	Bran flakes
¾ c	Other ready-to-eat cereal, unsweetened
1 c	Puffed cereal, unfrosted
½ c	Cereal, cooked
½ c	Grits, cooked
½ c	Rice or barley, cooked
½ c	Pasta, cooked; spaghetti, noodles, or macroni
3 c	Popcorn, popped, no fat added
2 tbsp	Cornmeal, dry
2½ tbsp	Flour
¼ c	Wheat germ
Crackers	
3	Arrowroot
2	Graham, 2½ inch square
1 half	Matzoth, 4 x 6 inches
20	Oyster
25	Pretzels, 3 inches long x 1/8 inch diameter
3	Rye wafers, 2 x 3½ inches
6	Saltines
4	Soda 2½ inches square
Dried Beans, Peas, and Lentils	
½ c	Beans, peas, lentils, dried and cooked
¼ c	Baked beans, no pork, canned
Starchy Vegetables	
1/3 c	Corn
1 small	Corn on cob
½ c	Lima beans
1/3 c	Parsnips
½ c	Peas, green, canned or frozen
1 small	Potato, white
½ c	Potato, mashed

The bread list continued

Amount	Food
½ c	Squash, winter, acorn, or butternut
⅓ c	Yam or sweet potato
Prepared Foods*	
1	Biscuit, 2 inch diameter (add 1 fat exchange)
1	Corn bread, 2 x 2 x 1 inches (add 1 fat exchange)
1	Corn muffin, 2 inch diameter (add 1 fat exchange)
5	Crackers, round butter type (add 1 fat exchange)
1	Muffin, plain, small (add one fat exchange)
8	Potatoes, french fried, 2 x 3½ inches (add 1 fat exchange)
15	Potato chips or corn chips (add 2 fat exchanges)
1	Pancake, 5 x ½ inches (add 1 fat exchange)
1	Waffle, 5 x ½ inches (add 1 fat exchange)
Chinese Foods	
1 small or medium	Bow (Chinese steamed dough)
6	Chestnuts
1 c	Congee
⅓ c	Glutinous rice, cooked
2/3 c	Gruel rice, cooked
½ c	Noodles, cooked (shrimp, thin rice, flat rice, cellophane)
2 tbsp	Rice flour or glutinous rice flour
3 small or 1/3 c	Taro
4	Wonton wrapper (5 x 5 inches)

A bread exchange is a serving of bread, cereal, or starchy vegetable that contains appreciable carbohydrate (15 G) and a small but significant amount of protein (2 g) totaling about 70 kcalories.

*These foods contain more fat than bread. When calculating fat values, add fat exchanges as indicated (1 fat exchange = 5 g fat).

The meat list (7 g protein, 3 g fat, plus variable added fat; 55 kcalories plus kcalories for added fat)

Amount	Food
Low-Fat Meat	
1 oz	Beef, baby beef (very lean), chipped beef chuck, flank steak, tenderloin, plate ribs, plate skirt steak, round (bottom, top), all cuts rump, spare ribs, tripe
1 oz	Lamb, leg, rib, sirloin, loin (roast and chops), shank, shoulder
1 oz	Pork, leg (whole rump, center shank), ham, smoked (center slices)
1 oz	Veal, leg, loin, rib, shank, shoulder, cutlets
1 oz	Poultry, meat-without-skin of chicken, turkey, cornish hen, guinea hen, pheasant
1 oz	Fish, any fresh or frozen
¼ c	Canned salmon, tuna, mackerel, crab, and lobster
5 (or 1 oz)	Clams, oysters, scallops, shrimp
3	Sardines, drained
1 oz	Cheese, containing less than 5% butterfat
¼ c	Cottage cheese, dry and 2% butterfat
½ c	Dried beans and peas (add 1 bread exchange)*
Medium-Fat Meat (add ½ fat exchange)*	
1 oz	Beef--ground (15% fat), corned beed (canned), rib eye, round (ground commercial)
1 oz	Pork--loin (all cuts tenderloin), shoulder arm (picnic), shoulder blade, Boston butt, Canadian bacon, boiled ham
1 oz	Liver, heart, kidney, and sweetbreads (these are high in cholesterol)
¼ c	Cottage cheese, creamed
1 oz	Cheese--mozzarella, ricotta, farmer's cheese, Neufchatel
3 tbsp	Parmesan cheese
1	Egg (high in cholesterol)
High-Fat Meat (add 1 fat exchange)*	
1 oz	Beef--brisket, corned beef (brisket), ground beef (more than 20% fat), Hamburger (commercial), chuck (ground commercial), roasts (rib), steaks (club and rib)
1 oz	Lamb--breast
1 oz	Pork--spare ribs, loin (back ribs), pork (ground), country-style ham, deviled ham
1 oz	Veal--breast
1 oz	Poultry--capon, duck (domestic), goose

The meat list continued

Amount	Food
1 oz	Cheddar-type cheese
1 small	Frankfurter
Peanut Butter	
2 tbsp	Peanut butter (add 2½ fat exchanges)*
Chinese Foods #	
¼ c	Canned or cooked abalone, crabmeat, eel, lobster, conch, cuttlefish, squid, fish maw, sea cucumbers, jellyfish, etc.
10 medium	River snails
2 medium	Frog legs
3 medium	Duck feet
1 medium or ½ large	Duck egg, salted
1 medium	Egg, preserved or limed
½ block	Soybean curd, fresh, 2½ x 1¼ x 1½ inches
2 pieces	Soybean curd, fried, 3 x 6 x ½ inches
Fast Foods +	

A meat exchange is a serving of protein-rich food that contains negligible carbohydrate but a significant amount of protein (7g) and fat (3g) roughly equivalent to the amounts in 1 oz of lean meat. It contains about 55 kcalories.

*These foods contain more carbohydrate or fat than lean meat. When calculating carbohydrate or fat values, add bread or fat exchanges as indicated.

#These exchanges are not separated into high-, medium-, and low-fat exchanges.

+Most fast-food meats are for variable numbers of exchanges and have other exchanges added: hamburger (1 high-fat meat, 2 bread, 260 kcalories); cheeseburger (1½ high-fat meat, 2 bread, 306 kcalories); Quarter Pounder (3 high-fat meat, 2 bread, 420 kcalories); Big Mac (3 high-fat meat, 2½ bread, 1½ fat, 540 kcalories); Quarter Pounder with cheese (4 high-fat meat, 2 bread, 520 kcalories); Egg McMuffin (2 high-fat meat, 1½ bread, 1 fat, 350 kcalories); pork sausage (1 high-fat meat, 1½ fat, 185 kcalories).

The fat list (5 g fat, 45 kcalories)

Amount	Food
Polyunsaturated Fat	
1 tsp	Margarine, soft, tub, or stick*
	Avocado (4 inches in diameter)#
1 tsp	Oil, corn, cottonseed, safflower, soy, sunflower
1 tsp	Oil, olive#
1 tsp	Oil, peanut#
5 small	Olives#
10 whole	Almonds#
2 large whole	Pecans#
20 whole	Peanuts, Spanish#
10 whole	Peanuts, Virginia#
6 small	Walnuts
6 small	Nuts, other#
Saturated Fat	
1 tsp	Margarine, regular stick
1 tsp	Butter
1 tsp	Bacon fat
1 strip	Bacon, crisp
2 tbsp	Cream, light
2 tbsp	Cream, sour
1 tbsp	Cream, heavy
1 tbsp	Cream cheese
1 tbsp	French dressing+
1 tbsp	Italian Dressing+
1 tbsp	Lard
1 tbsp	Mayonnaise+
2 tsp	Salad dressing, mayonnaise type+
Chinese Foods	
1 tsp	Sesame or chili oil
1 piece	Coconut meat, 1 x 1 x 1.2 inches
2½ tsp	Coconut, grated
2 tsp	Coconut cream (no water)
1 tbsp	Sesame seeds
1 inch cube	Fatty cured Chinese pork

A fat exchange is a serving of any food that contains negligible carbohydrate and protein but appreciable fat (5 g) totaling about 45 kcalories.

*Made with corn, cottonseed, safflower, soy, or sunflower oil only.

#Fat content is primarily monounsaturated.

+If made with corn, cottonseed, safflower, soy, or sunflower oil, can be assumed to contain polyunsaturated fat.

Eva May Hamilton and Eleanor Whitney, *Nutrition Concepts and Controversies*, (St. Paul, Minnesota: West Publishing Company, 1979).

Unlimited foods (negligible kcalories)

Amount	
	Diet kcalories-free beverage
	Coffee
	Tea
	Bouillon without fat
	Unsweetened gelatin
	Unsweetened pickles
	Salt and pepper
	Red pepper
	Paprika
	Garlic
	Celery salt
	Nutmeg
	Lemon
	Mustard
	Chili powder
	Onion salt or powder
	Horseradish
	Vinegar
	Mint
	Cinnamon
	Lime
Raw vegetables	
	Chicory
	Chinese Cabbage
	Endive
	Escarole
	Lettuce
	Parsley
	Radishes
	Watercress
Chinese Foods	
	Plain agar-agar
	Seasonings, spices, herbs* such as soy sauce, monosodium glutamate, star anise, five-spices powder
	Chinese parsley, kelp, sea girdle, laver, and seaweed hair
1 tsp	Shrimp sauce or dried shrimp
1 tsp or 2	Gingko nuts
¼ block	Red bean curd cheese, 1 x ¼ x ½ inch
1 c or less	Watery vegetables, including bamboo shoots, bitter melon, bottle gourd, cabbage (celery, mustard, or spoon; fresh, pickled, spiced, salted, or salted and dried), Chinese broccoli, Chinese eggplant, fungi (black, brown, or white), snow peas, turnips (Chinese or green), watercress, winter melon, wolfberry leaves

These are free foods that contain negligible carbohydrate, protein, and fat and therefore negligible kcalories.

*Does not include some starchy and sugar-preserved Chinese herbs.

SKILL BUILDER

NUTRITION WORD PUZZLE

Words to Know

- nutrition
- malnutrition
- nutrient
- vital
- function
- calorie
- habit
- fats
- protein
- iron
- diet
- empty calorie

Find the hidden nutrition words --

X	O	Y	M	L	D	F	A	T	S	L	F	F
J	K	L	A	M	Z	L	N	K	L	H	Z	U
B	B	T	L	T	D	E	L	M	A	F	V	N
X	I	C	N	C	I	V	X	B	P	O	D	C
V	D	C	U	R	K	M	I	R	O	N	B	T
M	N	J	T	J	F	T	W	H	G	X	V	I
X	Y	U	R	P	G	V	Z	Q	C	S	J	O
B	N	Z	I	W	X	P	R	O	T	E	I	N
E	M	P	T	Y	C	A	L	O	R	I	E	Z
J	D	D	I	E	T	T	Z	M	L	G	H	J
M	N	Z	O	C	E	I	R	O	L	A	C	Z
Z	B	C	N	U	T	R	I	T	I	O	N	O

SKILL BUILDER #1 KEY

Teacher Key

```
      M L  F A T S     F
      A       N     H  U
    T L    E     A     N
  I   N  I     B       C
V     U R    I R O N   T
      T    T           I
    U R                O
  N   I    P R O T E I N
E M P T Y C A L O R I E
    D I E T
      O   E I R O L A C
      N U T R I T I O N
```

SKILL BUILDER

NUTRITION QUESTIONS

1. List four ways in which the body uses nutrients.

   a. ______________________________

   b. ______________________________

   c. ______________________________

   d. ______________________________

2. What do carbohydrates do for the body?

3. Why is it important to have some fats every day?

4. What nutrient helps to build and repair body cells and fight disease?

5. What happens to a person when more carbohydrates, fats, and proteins are taken into the body than are used?

6. What nutrients are provided by liver?

7. Which vitamin and mineral are necessary for healthy teeth?

8. Why is iron necessary for the body?

9. If a child has a broken bone, what foods would you serve to aid in healing?

10. If a child seems to be lacking in energy, what nutritious foods would provide for this need?

SKILL BUILDER #2 KEY

1. a. for energy
   b. for body growth
   c. healing and repair of cells
   d. to carry on vital body processes

2. Provide energy and fiber.

3. Fats provide fatty acid which promotes normal growth and healthy skin.

4. Proteins.

5. The person gains weight.

6. Vitamin A, the B vitamins, and iron.

7. Vitamin C and calcium.

8. Iron helps make hemoglobin so blood can carry oxygen to the cells, and it helps the cells to use oxygen.

9. Foods with calcium: dairy products, green leafy vegetables, sardines, processed fish eaten with bones.

10. Fruits, vegetables, nuts, vegetable oils, milk, dairy products, meat, eggs, fish, poultry.

SKILL BUILDER

DIET ANALYSIS

24-Hour Intake

Using the form below, record all foods eaten during the last 24 hours, then put that food in the proper food group.

24-HOUR FOOD INTAKE

FOODS EATEN	Amount Eaten	Approx. No. of Servings	Grain Group	Milk Group	Fruit and Vegetable Group	Meat Group	Empty Calorie
BREAKFAST							
LUNCH							
DINNER							
SNACKS							

(A)					
(B)					
(C)					
(D)					

A. Total number of servings eaten

B. Servings required per day

C. Servings required but not eaten (subtract A from B)

D. Servings eaten but not required (subtract B from A)

Compare your intake with the daily requirement page:

1. What did you lack yesterday?

2. Did you eat too much of anything? What?

SKILL BUILDER

PLANNING A DAILY MENU

Have a classmate help you to measure your height accurately.

Check a height and weight chart to determine the number of calories you need for your height.

Use the basic four food groups and Nutrient Density Charts as guides to planning a one-day menu for yourself. Include only foods you would eat!

Height ________

Daily Calorie Needs ________

Daily Menu

a bird's eye view

USING BODY MECHANICS
TO LIFT AND MOVE HEAVY OBJECTS

Understand this science concept:

Balanced movement reduces fatigue and strain on muscles.

Teacher Materials
Information Sheet
Sample Lesson Plan

Student Materials
Assignment Sheet: Lift and Move Objects Using Correct Body Mechanics and Posture
Information Sheet: Changing Linens on a Hospital Bed
Skill Builders: Words to Know
Body Mechanics Reduce Fatigue

TEACHER INFORMATION SHEET

Understand this science concept:

Balanced movement reduces fatigue and strain on muscles.

Body Mechanics Reduce Fatigue

A worker is better able to perform when good body mechanics are used. Balanced movement reduces fatigue and strain on the muscles.

Some muscles help give your body shape and form. Others are attached to bones in such a way that it is possible for you to move and lift heavy objects. The body is a well organized "machine." Muscles are the main organs that move various parts of the body. Muscle groups can do their best jobs when used properly. Using the correct muscles to do the job is called body mechanics.

Posture is the relationship of the parts of the body to each other when standing, sitting, or lying. Alignment is positioning the body in proper lines. Balance is equal distribution of weight. When using a broad base of support, the body weight is balanced equally on both feet.

Staying in one position for long periods of time results in:

1. Permanent shortening of muscles (contractures)
2. Disability and deformity (contractures)
3. Formation of sores (decubitus ulcers or bedsores)

There are three major diseases and disorders related to the muscular system. They are:

1. Muscular atrophy which is wasting away of the tissue
2. Muscular contracture which is permanent shortening of a muscle
3. Muscular spasm which is involuntary, non-permanent, violent muscular contraction

Gravity is the force that pulls things together, and the center of gravity is the point around which all parts of the body balance each other. Fatigue and strain results when one does not apply the basic rules of proper body mechanics to movement.

Basic Rules of Proper Body Mechanics

1. Use the longest and strongest muscles in the arms and legs instead of small weak back muscles for lifting.

2. Carry objects close to the body rather than far away from the body.
3. Bend at the knees when stooping to pick up an object.
4. Move objects by pulling, sliding, or rolling whenever possible rather than lifting.
5. When moving objects, always pull, slide, or roll toward you rather than away from you.
6. For better balance give yourself a broad base of support by standing with feet 12 to 15 inches apart. Place one foot slightly ahead of the other and point the toes in the direction of movement.

Summary

When the correct principles of body mechanics are practiced and used:

1. They become habits
2. You have more strength
3. You use less energy to do a job
4. You are less tired at the end of the day

Esther Caldwell & Barbara B. Hegner, *Health Assistant* (Albany, NY: Delmar Publishers, 1973), pp. 38-43.

Grace V. Hornemann, *Basic Nursing Procedures*, (Albany, NY: Delmar Publishers, 1980), pp. 12-13.

Hospital Research and Educational Trust, *Being a Housekeeping Aide*, (Bowie, Maryland: Robert J. Brady Company, 1977).

See Chapter 5, Hospital Research and Educational Trust, *Being a Nursing Aide*, (Bowie, Maryland: Robert J. Brady Company, 1975).

SAMPLE LESSON PLAN

Science Concept: Motion

Task: Lift and Move Objects Using Correct Body Mechanics and Posture

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Objective: The student will be able to:

1. Explain the correct procedure for lifting a heavy object
2. Explain the correct procedure for sliding, pulling, or rolling a heavy object

---

Teaching Aids:

Transparency - Body Mechanics Evaluation
Medium weight object

I. Preparation of the Learner:

It is important to learn how to use your body properly when lifting, rolling, sliding, and pulling in order to prevent injury or fatigue. Moving objects is a common activity both on and off the job. Learning how to move is a skill that will pay off in your own comfort and health.

II. Presentation:

CONCEPT	CLASSROOM ACTIVITIES
Body mechanics	Lecture on proper body mechanics (Use Teacher Information Sheet).
Lifting objects	Demonstration: Have each student stand and place a medium weight object on the floor. Ask them to use the incorrect procedure of lifting the object. List the incorrect steps on the chalkboard. Incorrect steps are: 1. Place weight several feet in front of you on the floor. 2. Keep feet together. 3. Bend at back and lift object. Now list correct procedure of lifting on the chalkboard and ask students to lift the same object correctly.

II. Presentation: (Cont'd)

CONCEPT	CLASSROOM ACTIVITIES
	Correct steps are: 1. Place weight close to feet. 2. Maintain a broad base of support by placing feet 12-15 inches apart with one foot slightly in front of the other. 3. Bend at knees in a squatting position. 4. Lift weight by using strong leg muscles and keep back straight. 5. Hold weight close to the body. After completing each procedure, use the Body Mechanics Evaluation transparency. Discuss how the students felt after each procedure. Mark the students' feelings on the transparency for the incorrect and the correct procedure and compare results.
Sliding objects	Place a medium weight object on a desk or table in front of students. Ask them to use the incorrect method for sliding and rolling a weighted object. List the incorrect steps on the chalkboard. Incorrect steps are: 1. Place weight in center of table or desk. 2. Stand at the side of the table and push the weighted object away from you. 3. Reposition the weight in the center of the table. 4. Roll the weighted object away from you. Then list the correct procedures of sliding and rolling a weighted object on the chalkboard and ask the students to move the object correctly. Correct steps are: 1. Place the weight in the center of the table or desk. 2. Stand at the side of the table and spread feet 12-15 inches apart with one foot slightly in front of the other to maintain a broad base of support. 3. Flex knees slightly. 4. Extend arms under the weighted object and slide it towards you.

II. Presentation: (Cont'd)

CONCEPT	CLASSROOM ACTIVITIES
	5. Reposition the weight in the center of the table or desk. 6. Extend arms and roll the weighted object towards you. After completing each procedure, use the Body Mechanics Evaluation transparency and discuss how the students as a whole feel after each procedure. Mark the students' feelings on the transparency for the correct procedure and incorrect procedure. Compare results.

III. Application:

Have the students individually complete the Skill Builders on the Student Assignment Sheet.

OR

The Skill Builder, Body Mechanics Reduce Fatigue, can be completed with the entire class observing as each student performs an assigned task. Each performance would be evaluated for correct use of body mechanics.

TRANSPARENCY

BODY MECHANICS EVALUATION

Directions:

Place a check mark in the column that relates to how you felt after you completed the task.

Student________________________________

Task__________________________________

	INCORRECT PROCEDURE		CORRECT PROCEDURE	
	Hurts	Doesn't Hurt	Hurts	Doesn't Hurt
Muscles used				
Neck				
Shoulder				
Upper arm				
Lower arm				
Upper back				
Lower back				
Buttocks				
Upper leg				
Lower leg				

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ASSIGNMENT SHEET

Math Concept: Motion

Task: Lift and Move Objects Using Correct Body Mechanics and Posture

Why learn this?

By applying the rules of good body mechanics and posture, you may be more relaxed and have energy to spare at the end of the day. You will also feel happier and healthier.

Principle Emphasized:

Balanced movement reduces fatigue and strain on muscles.

Words to Know:

Alignment
Atrophy
Balance
Contracture
Decubitus ulcer
Fatigue
Gravity
Muscle
Spasm
Strain

Resources: Information Sheet - Changing Linens on a Hospital Bed

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1. Read the resources
2. Complete Skill Builder - Words to Know
3. Complete Skill Builder - Body Mechanics Reduce Fatigue

INFORMATION SHEET

CHANGING LINENS ON A HOSPITAL BED

Using good body mechanics and posture in all work stations reduces fatigue at the end of the day.

The proper procedure for making an open bed using correct methods of body mechanics and posture is as follows:

1. Move bed to its highest position.
2. Stand at the side of the bed, place feet 12-15 inches apart with one foot slightly ahead of the other to maintain a broad base of support.
3. Flex the knees slightly.
4. Use the once-around method for making a bed.

SKILL BUILDER

WORDS TO KNOW

Directions:

Put the following words into original sentences.

1. Alignment ____

2. Atrophy ____

3. Balance ____

4. Contracture ____

5. Decubitus Ulcer ____

6. Fatigue ____

7. Gravity ____

8. Muscle ____

9. Spasm ____

10. Strain ____

SKILL BUILDER

BODY MECHANICS REDUCE FATIGUE

Equipment/Supplies:

Hospital Bed
Set of Linens

Directions:

1. Make an open bed using incorrect methods of body mechanics and posture.

   Incorrect Procedures

   1. Position bed at lowest height
   2. Make open bed while ignoring all the basic principles of posture and good body mechanics

   After making the bed without following correct procedures, evaluate the feelings of your muscles. Record the results on the Body Mechanics Evaluation form.

2. Follow the correct procedure for making a bed as outlined on the information sheet. Evaluate muscle feelings again and record the results on the same form.

3. Select a second task from community and home services such as cleaning a bath tub, moving furniture, lifting a baby, or using commercial cleaning equipment. Perform the task using incorrect and correct body mechanics. Record the results.

BODY MECHANICS EVALUATION

Student______________________________

Task______________________________

	INCORRECT PROCEDURE		CORRECT PROCEDURE	
	Hurts	Doesn't Hurt	Hurts	Doesn't Hurt
Muscles used				
Neck				
Shoulder				
Upper arm				
Lower arm				
Upper back				
Lower back				
Buttocks				
Upper leg				
Lower leg				

Student______________________________

Task______________________________

	INCORRECT PROCEDURE		CORRECT PROCEDURE	
	Hurts	Doesn't Hurt	Hurts	Doesn't Hurt
Muscles used				
Neck				
Shoulder				
Upper arm				
Lower arm				
Upper back				
Lower back				
Buttocks				
Upper leg				
Lower leg				

a bird's eye view

USING HEAT AND COLD APPLICATIONS

Understand this science concept:

Heat expands blood vessels, and cold contracts them.

Teacher Materials
Information Sheet
Sample Lesson Plan

Student Materials

Assignment Sheet:	Use Safety Precautions with Heat and Cold Applications
Information Sheet:	Treatment by Heat and Cold Applications
Skill Builders:	Words to Know Procedures for Heat and Cold Treatments

TEACHER INFORMATION SHEET

Understand this science concept:

Heat expands blood vessels, and cold contracts them.

Generalized Heat and Cold Applications - Applying heat or cold to a patient's entire body.

Localized Heat and Cold Applications - Applying heat or cold to a specific part or area of a patient's body.

Heat

Heat is applied to the body to speed up the healing process. Heat expands the blood vessels (vasodilation). This allows more blood to circulate to the injury. More blood brings more food and oxygen which are necessary for repairing (healing) body tissue. Heat or cold can be applied to a small body area (localized) or to the whole body (generalized).

Cold

Cold contracts the blood vessels (vasoconstriction). This helps to prevent or reduce swelling and pervent bruises (ecchymosis). This contraction slows down the flow of blood and therefore, reduces the amount of body fluids that go to the injured area. This can also reduce or prevent pain that goes along with the swelling. Cold applications also help to stop bleeding because when the blood vessels become smaller, less blood can flow and seep out through the wound. Cold applications also can prevent the forming of pus in an area of the body that has been infected. For example, to prevent a ruptured appendix, a doctor might order cold packs to be placed on the patient to prevent the collection of pus and, thus, a rupture. The cold packs would be applied until surgery could be performed. Cold can also be applied to the patient's entire body to reduce a high temperature. Special equipment like an oxygen tent with a temperature regulator may be used.

When applying heat and cold applications it is important to remember to do the procedures carefully and follow the directions accurately. This will avoid burning or freezing the patient. Heat and cold applications should only be applied when directed by the doctor or supervisor in charge.

SAMPLE LESSON PLAN

Science Concept: Safety - Heat and Cold Applications

Task: Use Safety Precautions with Heat and Cold Applications

Objective: The student will be able to:

1. Explain the principle of using heat and cold applications as a form of patient treatment
2. Outline the correct procedures for heat or cold treatments

Teaching Aids:

Empty Glass Jar with Metal Twist-off Cap
Towel
Ice Scoop
Paper Towels
Cloth Cover
Ice Bag
Basin
Gauze Compresses
Bathtub
Safety Pin
Bath Blanket
Clean Gown
Ice Cubes
Mannequin
Hot Water Bottle
Container for Hot Water
Bath Thermometer
Electric Heating Pad

I. Preparation of the Learner:

Have you ever fallen and bruised your head? What happened to the bump? How did you treat it? Why?

II. Presentation:

CONCEPT	CLASSROOM ACTIVITIES
Heat expands, cold contracts	Experiment: To show the principle of how heat expands and cold contracts, do the following experiment with the students. Using the empty glass jar with a metal twist-off cap, twist the cap onto the jar tightly so it is hard to remove. Have students try to remove the cap to see that it is tight. Place the tightly screwed cap under running hot water from the tap and then unscrew the cap easily. Put students in groups of two and have them repeat the same activity for themselves. To show how cold contracts use the same empty jar and put the cap on so it is barely loose and place it in the freezer for two hours or overnight. Remove and note that the cap has contracted to fit the bottle. * Note the glass does not expand or contract but the metal cap will.

II. Presentation:

CONCEPT	CLASSROOM ACTIVITIES
Heat expands blood vessels, cold contracts blood vessels	Discuss how heat or cold applications help in patient recovery.
Methods of applying heat and cold treatments	Demonstration: Using the student information sheet, demonstrate the six methods for heat and cold treatments.

III. Application:

Have each student individually complete the Skill Builders on the Student Assignment Sheet.

OR

Have each student demonstrate the six methods on Skill Builder - Procedures for Hot and Cold Treatments.

See Section IX, Grace V. Hornemann, Basic Nursing Procedures, (Albany, NY: Delmar Publishers, 1980).

See Chapter 13, Hospital Research and Educational Trust, Being a Nursing Aide, (Bowie, Maryland: Robert J. Brady Company, 1975).

Evelyn L. Knoeder, Manual for the Nurse's Aide, (Albany, NY: Delmar Publishers, 1968), pp. 48-50.

ASSIGNMENT SHEET

Science Concept: Safety - Heat and Cold Applications

Task: Use Safety Precautions with Heat and Cold Applications

Why learn this?

Heat and cold applications are used to treat patients with certain diseases and conditions. It is important that you know how to administer this type of treatment.

Principle Emphasized:

Heat expands blood vessels, and cold contracts them.

Words to Know:

Circulate
Contract
Ecchymosis
Expand
Generalized
Infected
Localized
Ruptured
Vasoconstriction
Vasodilation

Resources: Information Sheet - Treatment by Heat and Cold Applications

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1. Read the resources
2. Complete Skill Builder - Words to Know
3. Complete Skill Builder - Procedures for Heat and Cold Treatments

INFORMATION SHEET

TREATMENT BY

HEAT AND COLD APPLICATIONS

Heat or cold applications are used as a form of treatment for some injuries or illnesses. The methods used to administer this type of treatment are:

Ice Bags and Cold Packs
Hot Water Bottle or Bag
Electric Heating Pad
Wet Dressing
Sitz Bath
Hot Soaks

It is important to follow the correct procedure when applying heat or cold treatment to avoid burning or freezing the patient. The procedures for each of the six methods of treatment are outlined below.

Ice Bags and Cold Packs

Equipment/Supplies:
Ice Bag
Cloth Cover
Ice Scoop or Spoon
Paper Towels
Ice Cubes (or Crushed Ice)
Mannequin

1. Fill the ice bag half full. This allows the bag to conform to the body better.
2. Expel the air by resting the ice bag flat on the table. Put the top in place, but don't screw it on. Squeeze the bag until all the air has escaped.
3. Screw on the top.
4. Dry the bag on the outside.
5. If ice bag is rubber or plastic, cover the bag with a cloth (rubber or plastic should not touch the patient's body).
6. Explain the procedure to the patient.
7. Use a mannequin (doll) as the patient and place the ice bag in the desired location.
8. Refill the bag as necessary. Length of treatment will be prescribed by the doctor.
9. Check skin after each use. Discolored skin or numbness should be reported to supervisor.
10. When treatment is complete, wash the bag with soap and water and let dry. Allow some air to remain in the bag and screw on the cap. Air in the bag prevents the sides from sticking together during storage.

11. Record time the ice bag was applied, length of treatment, and any unusual observations.

Hot Water Bottles or Bags

Equipment/Supplies:
- Hot Water Bag
- Container for Hot Water
- Paper Towel
- Cloth Cover
- Bath Thermometer
- Mannequin

1. Fill a container with warm water: 105° - 125°F (41-52°C).
2. Check the temperature with a bath thermometer.
3. Fill the bag 1/2 full (allows for conformity to the body).
4. Expel the air by placing the bag on a flat surface and holding the neck of the bag upright and squeeze. When the water reaches the neck, screw on the top.
5. Check the bag for leaks and dry with a paper towel.
6. Insert the bag into a cloth cover.
7. Explain the procedure to the patient.
8. Using the mannequin, apply the bag to the affected area.
9. Check the patient's condition every 15 minutes.
10. Refill the bag as necessary.
11. Record time the bag was applied, length of treatment, and any unusual observations.
12. Wash the bag before replacing the cap.

Electric Heating Pad

Equipment/Supplies:
- Electric Heating Pad
- Towel or Cloth Cover
- Patient

1. Make sure your hands are dry and that the cord, socket, and switch are in good repair.
2. Greet patient and explain the procedure.
3. Plug in the heating pad.
4. Turn switch to high to test that it is heating.
5. Turn down to proper temperature.
6. Apply the cloth cover to the pad.
7. Place on the affected area. Never use pins; this could cause a short circuit.

8. Make sure the patient does not rest on the electric heating pad.
9. Check the patient every 15 minutes to prevent burns.
10. After completing treatment, disconnect the pad and remove the cover to be laundered.
11. Record the time and length of treatment. Record any unusual observations.

Wet Dressing

Equipment/Supplies: Basin of Solution
Bath Thermometer
Gauze Compresses
Patient

1. Check the temperature of solution with bath thermometer. The temperature will be determined by the doctor.
2. Place the patient in a convenient position.
3. Place the compresses in the solution and wring out.
4. Apply to the affected area.
5. Return compress to the solution every two minutes; repeat three to four times as the doctor orders.
6. At the end of the treatment, dry the patient and make him/her comfortable.
7. Clean and replace the equipment.
8. Record time and length of treatment. Report any unusual signs.

Sitz Bath

Equipment/Supplies: Bath Tub
Bath Towel
Clean Gown
Face Towel
Safety Pin
Bath Blanket

1. The temperature in bathroom should be comfortable.
2. Fill the tub half full.
3. Use a bath thermometer to check the temperature of the water: 110° - 115° F (43 - 46°C).
4. Help the patient into the tub.
5. Cover the patient's shoulders with a bath blanket; secure with a safety pin.
6. Place a cool compress on the patient's forehead to reduce the possibility of a headache.

7. Observe the patient for signs of faintness or fatigue.

8. Increase temperature of the water as needed, but don't let incoming water touch the patient.

9. Remove the patient from the tub after 10-20 minutes.

10. Help the patient dry and get dressed in a clean gown.

11. Check the patient's vital signs.

12. Clean the tub and equipment used.

13. Record the time and length of sitz bath.

14. Report any unusual observation to your supervisor.

Hot Soaks

Equipment/Supplies: Tub or Basin
Warm Water
Medication if Ordered
Three Bath Towels
One Blanket
Bath Thermometer

1. Put the basin in a comfortable position for an arm, foot, or leg to soak.

2. Fill the basin about half full with solution. Test temperature with a bath thermometer.

3. Lower the leg, arm, or foot gradually into the solution.

4. Cover the body part to help keep in the heat.

5. Add more water as necessary to maintain the proper temperature.

6. Remove the body part and pat dry.

7. Record time and length of the treatment.

8. Report any unusual observations.

9. Clean and replace equipment.

SKILL BUILDER

WORDS TO KNOW

Directions:

Using the information sheet and a medical dictionary, write a paragraph about each of the following words as they relate to heat and cold applications. Use the space provided.

1. Circulate
2. Contract
3. Eccheymosis
4. Expand
5. Generalized
6. Infected
7. Localized
8. Ruptured
9. Vasoconstriction
10. Vasodilation

SKILL BUILDER

PROCEDURES FOR
HEAT AND COLD TREATMENTS

Directions:

Using a job sheet form, write a job sheet for each of the six methods used to apply heat and cold treatment to patients.

Plan and present a demonstration of each method.

JOB SHEET

(Format)

Job/Duty: ______________________________

____

Task: ____
(Statement of doing skill)

Introduction:	Outline scope of job
Supplies:	List supplies needed to perform job
Equipment:	List equipment needed to perform job
Procedure:	State each operation or step in the job clearly and concisely
	List operations in logical sequence
	Number operations consecutively
	List safety and key points where they apply
Sketch or Drawing:	Provide drawing or make sketch if necessary
Checkpoint:	A checkpoint may occur at any single step in the procedure where the instructor desires to check understanding before allowing the trainee to proceed.
	There may be more than one checkpoint in the job. Indicate CHECKPOINT by placing the word in the left margin of the job sheet at the point where the trainee is to be tested before proceeding with the next step.

Adapted from THE PREPARATION OF OCCUPATIONAL INSTRUCTORS, A Suggested Course Guide, U.S. Department of Health, Education, and Welfare.

a bird's eye view

COMMUNICATING EFFECTIVELY

Understand this behavioral science concept:

Speech and language are learned through imitation or modeling and reinforcement.

Teacher Materials
Information Sheet
Sample Lesson Plan

Student Materials
Assignment Sheet: Improve Speaking Skills
Information Sheet: Mechanics of Speaking
Skill Builders: Word Find
Communicating with Preschool Children
Evaluation of Personal Voice and Speaking Skills

TEACHER INFORMATION SHEET

Understand this behavioral science concept:

Speech and language are learned through imitation or modeling and reinforcement.

THE PSYCHOLOGY OF SPEAKING

Everyone has had an experience of being afraid to recite in class, because revealing what you know or don't know opens you to criticism from others and makes you feel inadequate. Speaking in front of others is an experience powerful enough to make our legs shake. Speaking outloud with others is a major form of communication. We understand how powerful, important, and useful this tool is when we lose the ability to speak during a bad cold. Many people are more comfortable if they only write to communicate with others and avoid the position of being on-stage. However, like any other skill, practice can lead to perfection. One learns to speak comfortably by speaking. Being comfortable as the speaker comes over a period of time as one speaks with others.

Speech grows from listening. One learns and models the kind of speech most often heard. This includes correct grammar, habits of praise or criticism, baby talk, slang, and swearing.

One cannot be a speaker and listener, effectively, at the same time. A speaker must be heard. A listener must courteously wait for a turn before inserting what is to be communicated. Interrupting is a habit that interferes with good communication. It is also uncomfortable to be around people who dominate conversation all the time. It takes at least two people to have a constructive conversation. This means that there should be give and take on both sides.

Words have the power to draw people close or drive people apart. Word power is the way words are used. It has been the cause of wars as well as peace. It may be a major factor in keeping or losing both friends and customers. Poor choice of words can leave unhappy feelings that develop into long-term grudges. Gossip is relaying information, either factual or rumor, that may degrade or hurt another person. It is probably safe to say that little is gained by anyone during verbal conflicts or gossip. Real effort should be taken to avoid both. Lowering one's voice in a calm manner can have a soothing effect on another party who is set on causing a conflict.

Avoid sarcastic statements, name calling, labeling, shaming, and all other degrading terms which may add fuel to the heated debate. Never allow a debate or discussion to lead into a physical battle. Show as little resentment in the tone or words as possible. Keeping one's composure and temper will allow clearer thinking in the situation. Losing self-control is always degrading. There are many situations when withdrawal from the area is the most useful course of action.

It is a more mature person who can admit to others that they were at fault or in a bad mood and apologize for their actions. Saying, "I'm sorry," is hard to do. Accepting an apology is awkward, too. Try saying, "You have made me feel better, too."

Finding fault with others is destructive to their self-esteem. Evaluating through constructive criticism is fine if the one being evaluated is willing to listen. It isn't bad to "let off steam" if you can do it in ways that don't hurt.

Listening with empathy to the feelings of others and seeing their point of view are positive reactions that will help you get along with others. You do not always have to agree with others to get along, but at times it may be better to keep the disagreement to yourself.

GUIDES TO BETTER CONVERSATION

The following guides should be practiced in speaking with others.

1. Use the correct names of others when talking with them. This shows other persons that you are interested in them and are involved enough to learn their names.
2. Avoid gossip and gossiping.
3. Avoid sarcastic remarks, name calling, shaming, and degrading terms.
4. Avoid criticizing or arguing without the consent of the other person. If criticism is given, it should be done with the goal of improving a particular skill.
5. Learn to apologize and accept the apologies of others.
6. Give others a chance to express themselves; avoid interrupting.
7. Listen do not dominate the conversation.
8. Be an enthusiastic message-sender and an empathetic message-receiver.
9. Look the listener in the eye.
10. Think about what you are going to say before saying it.
11. Praise others with sincerity and praise frequently.

SAMPLE LESSON PLAN

Science Concept: Communication
Task: Improve Speaking Skills

Objective: The student will be able to:

1. Explain the value of having good speaking skills
2. List ways to build and improve present speaking skills

Teaching Aids:

Chalkboard
Chalk
Pencil
Paper

I. Preparation of the Learner:

INTRODUCTORY ACTIVITY, MECHANICS OF SPEAKING: Have each student pretend to be physically unable to talk. Once it is established that there is to be a role-playing activity without any talking, have the students count off by two's by holding up 1 or 2 fingers alternately until everyone in the room is numbered. Numbering silently will help the students develop the mood for the role-play.

1. Ask all number 1's to pretend that they feel a sneeze coming on but have no tissues so they must gesture to the number 2's in some manner to let them know what they need.
2. Have the number 2's pretend that they are in a fancy restaurant with a number 1 who has accidentally spilled catsup onto their front. It is important to remove the catsup before it spreads all over, or other people see it causing number 2 embarrassment.

Use these two activities as a lead-in for a discussion of why speaking skills are important.

II. Presentation:

CONCEPT	CLASSROOM ACTIVITIES
Importance of good speaking skills	Discussion: Why are speaking skills important?
Guides to better conversation	Chalkboard talk: (Use Teacher Information Sheet).

II. Presentation:

CONCEPT	CLASSROOM ACTIVITIES
Introductions	ROLE PLAY: The purpose of this activity is to help students evaluate the correctness of introductions. Choose students for the role play and have them present Situations A, B, and C to their classmates. Ask students to respond and arrive at a conclusion about appropriate behavior in each. SITUATION A: You and a stranger are confronted with the need to work in close contact with each other on a job. The other person is waiting for you to handle the situation. What would you do or say? SITUATION B: You are with one of your friends and you sit down in the cafeteria across from a person you know. How will you handle the introductions in order to have an enjoyable conversation? SITUATION C: You are with a person who meets a personal friend that you don't know. Your friend forgets to introduce you. You finally have a chance to take part in the conversation. How would you handle the situation and not embarass either your friend or the other person?
Constructive and destructive conversation	CHECKLIST: Read the following statements to the class and have them write down whether each is constructive or destructive. Afterwards, discuss each answer. 1. "Elsie, I didn't think my friend would use my homework to copy, then tell that I copied." 2. "This really bothers me. I think it's unfair for each of us to work full time, and then when I come home, I have supper to get while you always watch TV." 3. "This bedroom smells like a barnyard. Only a slob could wallow in here." 4. "Down the tube! You crumb! Here we finally bought a home, now you lose the payment at poker."

II. Presentation:

CONCEPT	CLASSROOM ACTIVITIES
	5. "Get off your fanny and shut up that baby before I go nuts. I worked hard all day while you watched the Soaps." 6. "I really get so upset when you are late getting home. Could you call to let me know you have stops to make so I don't imagine you have had a wreck?" 7. "You call yourself a mother? Then how come you go off to work and leave your baby with a stranger?" 8. "Why do you boss me around? I have feelings. I can think for myself but give me time. When I get things thought out myself, I do a better job."

III. Application:

Have students complete the Skill Builders on Student Assignment Sheet individually or as a group.

ASSIGNMENT SHEET

Science Concept: Communication

Task: Improve Speaking Skills

Why Build Effective Speaking Skills?

Have you ever felt as though you put your foot in your mouth when you said something you would like to recall? Put your mind at ease. We all have had problems like this in communicating with others. It takes effort to try to improve. You can teach yourself to be more comfortable when talking to others on the job, on dates, in school, and before groups. We all have admired someone who is outgoing and seems to be at ease with others. You can enjoy being the one admired if you pay attention to improving your speaking skills.

Principle Emphasized:

Speech and language are learned through imitation or modeling and reinforcement.

Words to Know:

Mechanical Difficulties

Chatter
Communication
Expression
Modulating
Monotone
Non-Verbal
Oral
Pitch
Rhythm
Speaking
Tone
Verbal
Vocabulary
Vocal
Voice
Volume

Social Difficulties

Apologize
Baby Talk
Conflict
Constructive
Conversation
Criticism
Debate
Degrading
Destructive
Dominate
Empathy
Interrupting
Rumors
Sarcastic
Slang
Swearing
Word Power

Resources: Information Sheet - The Mechanics of Speaking

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1. Read the resources.
2. Complete Skill Builder - Word Find
3. Complete Skill Builder - Communicating with Preschool Children
4. Complete Skill Builder - Evaluation of Personal Voice and Speaking Skills

INFORMATION SHEET

THE MECHANICS OF SPEAKING

Over 20 million Americans, nearly 10 percent of all children and adults in the United States, have speech, language, or hearing impairments which severely affect their ability to communicate. Tragically, many of these individuals are suffering needlessly since most communication disorders can be helped by trained specialists. Most difficulties can be overcome through a conscious effort of the individual in programs like yours.

Lincoln said, "You can tell the cut of the man when he opens his mouth." People reveal how smart or unknowing they are as they talk. Everyone has a need to communicate with others. Communication is either verbal, with words, or non-verbal, with gestures. Both essentially send messages which must be understood by others to be considered communication. Verbal communication includes the language skills of listening, speaking, writing, and reading. Oral expression is the process of using the voice to send messages, and is otherwise called speaking. Idle chatter is a meaningless set of oral sounds with no particular productive purpose.

One accumulates a collection of words, or vocabulary, that has meaning because of the experiences associated with the words. A limited vocabulary restricts word choice. It may include a variety of four-letter swear words, used as shortcut expressions for lack of better known appropriate words. Changing a limited vocabulary means finding better words as substitutes and using more self-control.

Vocal quality is important in helping others feel comfortable as you speak. Television announcers are probably chosen with this in mind as they usually have firm, mellow voices. Have you ever watched a beautiful person only to be shocked and surprised at the contrast when he or she spoke? The quality of the voice and the quality of the physical appearance were not matched.

Check your own impressions. What does a too-soft, weak voice relay about the speaker? What impression does a harsh, abrupt voice make? What mood can a high-pitched, flighty voice create? Low-pitched calm voices convey another mood and meaning.

One can control and vary the volume (loudness and softness), pitch (highness and lowness), tone (manner or mood), and rhythm (fastness, slowness, or choppiness).

Modulating one's voice or changing the volume, pitch, and rhythm is more effective and interesting than speaking in a monotone or speaking continuously at one pitch. Telephone operators, receptionists, and telephone salespersons are usually selected because they have a pleasant "smile" in their voices. This is a quality that needs to be developed. If one has inadequate hearing, is deaf, or has a physical deformity or injury of the mouth, a specialist should be consulted to provide help in speaking.

Guides to Better Conversation

Try to practice the following guides in your speech with others.

1. Speak clearly and slowly enough to be understood
2. Speak loudly enough to be heard
3. Use standard English rather than slang
4. Use complete sentences
5. Pronounce words correctly
6. Add new words to your vocabulary regularly
7. Occasionally evaluate your own voice quality and speaking mannerisms and change as needed

SKILL BUILDER

WORD FIND

Directions:

Find the words listed below and circle them.

```
A P O L O G I Z E A C R I T I C I S M B D E
M C N Y O W P U T V E R B A L I H T G N F J
C Z O A X G T Q H R S H R P O N O M L O Q K
B O C M D V E F S G U Y V W X N Y Z E N A D
I V N J M K L L I M H T N O E L H F C V G B
R O S F N U M K J V G H O P F O K J R E S B
Q C P U L X N Y O G E M P A T H Y I A R C T
O A T D C I E I F H Z I Y J X E W D V B U E
A B V B N L C K C M O D U L A T I N G A C V
O U W N M E M T K A L F S D T Y U A B L S I
P L C U S S I N G H T G H E X Z V V L M R T
Z A O R A P B I J G N I K A E P S U W Q O C
Q R Y Z E C Q D R F S G O T J I K G N R M U
X Y W O R D P O W E R L I N N T R N O P U R
W D E S T R U C T I V E M K O C P A Q S R T
A G B J C I D K E R B F L Z A H Y L T X U S
H M O N O T O N E D C A E X P R E S S I O N
S Y T G U E V T F W T M T T X U G V H V W O
X H Z Q O P T S D Y U A D O M I N A T E A C
J K R N J A G E B L B D E G R A D I N G X Y
L I M I H F H A O R A L W R W Q P E N D Z W
J V O C A L B V C V Y U X T S Y M O B T U B
V T C O N V E R S A T I O N J K Z L C A R S
S K U W D Y N A O B P C Z G L I M A E N T V
F Q E L X M Z I N T E R R U P T I N G B Q E
R S A R C A S T I C K G H S W E A R I N G H
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1. Apologize
2. Baby Talk
3. Chatter
4. Communication
5. Conflict
6. Constructive
7. Conversation
8. Criticism
9. Debate
10. Degrading
11. Destructive
12. Dominate
13. Empathy
14. Expression
15. Interrupting
16. Modulating
17. Monotone
18. Non-verbal
19. Oral
20. Pitch
21. Rhythm
22. Rumors
23. Sarcastic
24. Slang
25. Speaking
26. Swearing
27. Tone
28. Verbal
29. Vocabulary
30. Vocal
31. Voice
32. Volumn
33. Word Power

SKILL BUILDER

COMMUNICATING WITH PRESCHOOL CHILDREN

Directions:

Observe speech in the preschool. Record questions asked between teachers and children. Obtain at least 10 per day. Analyze and explain the situations during related class.

*** KEY: WHY QUESTION WAS ASKED**

1. To obtain information about something
2. To give choice, elicit opinion preference
3. To suggest a possibility of what to do
4. To clarify the situation
5. To greet or recognize person
6. To attract attention to an activity
7. To encourage them to talk
8. To praise
9. To distract from undesired behavior
10. Other (Explain)

QUESTIONER	TO WHOM	QUESTION	RESPONSE	KEY
Example: *Ms. Sue*	*Teri*	*Where did you get that sharp shirt?*	*Teri grinned shyly, ran off, pleased.*	5 , 7
Mrs. G.	Joshua	How are you today?	He said "fine," and smiled.	
Ms. Carla	Julie	Isn't that a pretty design?	Others looked and agreed.	
Ms. Sheila	All Children	What happened next in the story?	They all started to talk.	
Ms. Rhonda	Stephanie	Do you want to swing or ride a bike?	She chose a bike.	
Ms. Johnna	Debbie	Did you have a good time over the weekend?	"Nothin' happened."	
Ms. Chris	All Children	(Beginning of Art) Did you go to the haunted house?	Several said "yeah."	
Mrs. G.	Travis	Will you take this pumpkin over there? (He was crying)	He seemed glad to help and stopped crying.	
Mrs. Stacy	Kent	Is that a new sweater you have on?	He felt it and nodded.	
Ms. Tiffany	Meredith	Will you hold this until I go?	She did.	
Ms. Kris	Donna	Are you ready for storytime yet?	No--trying to speed her up.	

OBSERVATION OF

QUESTIONING TECHNIQUES

QUESTIONER	TO WHOM	QUESTION	RESPONSE	KEY #

SKILL BUILDER

EVALUATION OF PERSONAL VOICE AND SPEAKING SKILLS

Directions:

Record your voice in general conversation with a chosen partner. Listen to your voice several times to evaluate the pitch, tone, volume and rhythm. Using this form, identify specific difficulties and suggest ways to improve. Hold an individual conference with your teacher to discuss plans and progress in building better speaking skills.

YES	NO	
___	___	1. Is my voice weak or do I whine?
___	___	2. Do I speak harshly with sarcasm?
___	___	3. Is the pitch of my voice too high?
___	___	4. Is my voice pleasant to hear?
___	___	5. Does my voice become too loud, too often?
___	___	6. Is my enunciation poor?
___	___	7. Do I use grammar properly?
___	___	8. Do I use vulgar, inappropriate words?
___	___	9. Do words come too slowly?
___	___	10. Do I talk so continuously people turn me off?
___	___	11. Do I dominate conversations?
___	___	12. Do I interrupt others often?
___	___	13. Do I seem to dislike to talk?
___	___	14. Do I speak too fast?
___	___	15. Have I often repeated myself?
___	___	16. Do I gossip?
___	___	17. Do I argue with others?
___	___	18. Am I comfortable making introductions?
___	___	19. Do I often use annoying fillers such as "OK," "ooohh," "you know," and "yeah"?
___	___	20. Do I use baby talk?
___	___	21. Do I make fun of others?
___	___	22. Do I often grumble and criticize?
___	___	23. Do I often use excuses/alibis?
___	___	24. Do I often find myself uncomfortable talking to new people?
___	___	25. Am I moody and let others know it?

a bird's eye view

DEVELOPING SKILLS OF GROUP CONTROL

Understand this behavioral science concept:

Behavior is the result of action and reaction.

Teacher Materials
Information Sheet
Sample Lesson Plan

Student Materials
Assignment Sheet: Control Groups of Preschool Children
Information Sheet: Group Control in Preschool
Skill Builders: Words to Know
Handling Problem Behavior
Group Control

TEACHER INFORMATION SHEET

Understand this behavioral science concept:

Behavior is the result of action and reaction.

CHILD MANAGEMENT TECHNIQUES IN SUPERVISING CHILDREN

Golden Rule: "Do unto others as you would have others do unto you." This is the basis of democracy, since it implies equality of individuals.

MUTUAL RESPECT based upon the assumption of equality is the right of all human beings. No one should take advantage of another; neither adult nor child should be a slave or a tyrant. Distinguish between firmness and domination. Firmness refers to your behavior in a conflict situation; domination means forcing your will upon the child. For example, assume the children are fighting in the kitchen while you are preparing a meal. Tell the children that they may continue fighting in another room where it will not disturb you. By speaking firmly but kindly, you maintain respect for yourself and show respect for the children by offering them a choice between behaving in the kitchen or fighting in another room. You have refused to act as a tyrant yourself, but you also have refused to be tyrannized by the children.

ENCOURAGEMENT implies faith in, and respect for, the child as the child is. Don't discourage the child by having too high standards and being over-ambitious. A child misbehaves only when discouraged and when he or she believes that success cannot be achieved by useful means. A child needs encouragement just as a plant needs sunshine and water. When we tell children that they could be better, what we are really telling them is that they are not good enough as they are.

REWARD AND PUNISHMENT are outdated. A child soon considers a reward his or her right and then may demand a reward for everything. A child may consider that punishment gives the right to punish in return. The retaliation of children is usually more effective than the initial punishment inflicted by the parents. Children often retaliate by not eating, fighting, neglecting school work, or otherwise misbehaving in ways that are the most disturbing to the parents.

NATURAL CONSEQUENCES is a technique which can be used effectively only when a good relationship exists between parent and child. In using this technique, the parent allows the child to experience the logical consequences of behavior.

For example, if a child dawdles in the morning, the logical consequence of the behavior is that the child will be late for school. Instead of using personal authority to remind and hurry the child, the parent allows the child to experience the unpleasantness of being tardy. Therefore, when natural consequences are used, the child is motivated toward proper behavior through experiences with the social order in which the child lives. Only in moments of real danger is it necessary to protect the child from the natural consequences of misbehavior.

ACTING INSTEAD OF TALKING is more effective in conflict situations. Talking provides an opportunity for arguments in which the child can and may defeat the parent. Children tend to become "parent deaf" and they will act only when punishment is threatened. Usually a child knows very well what is expected. Never explain to a child what he or she already knows and has heard repeatedly. Talking should be restricted to friendly conversation and should not be used as a means of discipline. For example, if you are driving your car and your children start to quarrel and fight, instead of telling them to be quiet, you can pull the car to the curb and simply wait for them to be quiet. With a calm, patient attitude, the parent can accomplish positive results.

WITHDRAWAL AS AN EFFECTIVE COUNTERACTION. Withdrawal (leaving the child and walking into another room) is most effective when the child demands undue attention or tries to involve you in a power contest. There is no satisfaction in annoying if nobody pays attention, and tantrums will not work without an audience. Withdrawal is not surrender or indifference. Beware of overconcern - feeling you must "do something" about every situation. Often doing nothing brings about wonderful results.

WITHDRAWING FROM THE PROVOCATION, BUT NOT FROM THE CHILD. Don't talk in moments of conflict. Give attention and recognition when children behave well, but not when they demand it with disturbing behavior. At these times, attention becomes a premium for bad behavior. The less attention children receive when they disturb, the more they need it when they are cooperative. You may feel that anger helps eliminate your own tensions, but it does not teach the child what you think should be learned.

DON'T INTERFERE IN CHILDREN'S FIGHTS. By allowing your children to resolve their own conflicts, they learn to get along better together. Many fights are provoked to involve the parent. By separating the children or acting as judge, we fall for their provocation, thereby stimulating them to fight more.

TAKE TIME FOR TRAINING and teaching the child the essential skills and habits. Don't attempt to train a child in a moment of conflict or in company. Allow for training at calm times, regularly, until the lesson is learned. If many areas need improvement, give attention to one at a time. Limit yourself to what you can do. The parent who "does not have time" for such training will have to spend more time correcting an untrained child.

AVOID LETTING YOUR OWN NEED FOR PRESTIGE influence you in training your child. For example, if your child knows how to dress, but is sloppy about personal appearnce, avoid the impulse to remind the child or straighten clothes yourself because you are afraid of what others will think of you as a parent. Your own prestige is less important than letting the child learn for him or herself.

NEVER DO FOR A CHILD WHAT THE CHILD CAN DO FOR SELF. A "dependent" child is a demanding child. Maintain order and establish your own independence. Most adults underestimate the abilities of children. Give children opportunities and encouragement to become contributing members of the family and other groups. Children become irresponsible only when we fail to give them opportunities to take on responsibility. In assuming children's responsibilities, we deprive them of the opportunity to learn. Don't indulge yourself by giving service.

PARENT'S DEPENDENCE ON THE CHILD is a difficult concept to recognize. In many instances a parent who constantly reminds and does things for a child increases dependency of both parent and child.

UNDERSTANDING THE CHILD'S GOAL. Every action of the child has a purpose. The basic aim is to have a place in the group. A well-adjusted child has found the way toward social acceptance by conforming with the requirements of the group and by making useful contributions to it. The misbehaving child is still trying, in a mistaken way, to feel important in the world. For example, a young child who has never been allowed to dress him or herself, who has not been allowed to help in the house, will lack the feeling of being a useful contributing member of the family and will feel important only when making the parent angry and annoyed with misbehavior.

THE FOUR GOALS OF A CHILD'S MISBEHAVIOR. Children are usually unaware of their goals. A child's behavior, though illogical to others, is consistent with his/her own interpretation of their place in the family group.

GOAL 1: Attention getting -- wants attention and service
GOAL 2: Power -- wants to be the boss
GOAL 3: Revenge -- wants to hurt
GOAL 4: Display of inadequacy -- wants to be left alone, with no demands

OUR REACTIONS TO A CHILD'S MISBEHAVIOR PATTERNS. Very often we can discover a child's goals by observing our own reactions to the child's behavior. For example, when the goal is attention getting, we respond by feeling annoyed and by reminding and coaxing. When the goal is power, we respond by feeling provoked and then get into a power contest. When the goal is revenge, we respond by feeling deeply hurt. When the goal is display of inadequacy, we respond by feeling helpless. If your first impulse is to act in one of those four ways, you can be fairly sure that you have discovered the goal of the child's misbehavior.

DON'T ACT ON YOUR FIRST IMPULSE. By acting on your first impulse, you tend to intensify the child's misbehavior patterns rather than correct them. You act in accordance with their expectations and thereby fortify their mistaken goals. What can you do when you don't know what to do? First, think of what you know would be wrong to do and refrain from doing it; the rest is usually all right. Second, imagine what the child expects you to do, and then do the opposite. This throws the child off guard and then you can arrange what to do about the situation.

MINIMIZE MISTAKES. Making mistakes is human. Regard your mistakes as inevitable instead of feeling guilty and you'll learn better. We must have the courage to be imperfect. The child is also imperfect. Don't make too much fuss and worry about mistakes. Build on the positive, not the negative. For example, instead of pointing out how badly they tie shoes, point out instead how well they can button a shirt.

DON'T BE CONCERNED WITH WHAT OTHERS DO but accept responsibility for what you can do. By utilizing the full potential of your own constructive influence, you do not have to think about what other influences do to the child. Compensation for the mistakes of others is unwise, and overprotection may rob the child of courage and resourcefulness. For example, if father is too harsh with the child, and mother runs to protect, three negative results are accomplished. First, mother deprives father and child from learning to get along with each other. Second, mother is teaching the child to run to her for protection instead of using own resources. Third, mother antagonizes father so that he is less willing to cooperate with her on situations dealing with the child.

HAVE FUN TOGETHER and thereby help to develop a relationship based on mutual respect, love and affection, mutual confidence and trust, and a feeling of belonging. Playing together, working together, and sharing interesting and exciting experiences lead to a kind of closeness which is essential for cooperation. Instead of using talk as a means to nag, scold, preach, and correct, utilize talking to maintain a friendly relationship. Speak to your child as you would speak to your friend.

Adapted from: A B C's of Guiding the Child, Rudolph Drakurs.

SAMPLE LESSON PLAN

Science Concept: Supervision
Task: Control Groups of Preschool Children

Objective: The student will be able to:

1. List the basic needs which influence behavior
2. Suggest which needs a child seems to be trying to satisfy by his or her observed behavior
3. Select, plan, and present an activity to a group of children to practice techniques of group control

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Teaching Aids:

Chalkboard
Chalk

I. Preparation of the Learner:

What is a technique you have used to control a group of preschool children? (List ideas on chalkboard)

II. Presentation:

CONCEPT	CLASSROOM ACTIVITIES
Basic needs influence behavior	List the basic needs which influence behavior on the chalkboard
Preschool group control techniques	Discussion: 1. What preplanning should take place before group activities? 2. How could you set limits to achieve group control? 3. What behavior should the preschool teacher use to control group behavior?
Techniques for presenting group activities	Simulation: Giving clear, simple directions which are easily understood is an important skill. Practicing the skill with peers will help the student become more proficient.

II. Presentation:

CONCEPT	CLASSROOM ACTIVITIES
	This activity should help students identify the importance of giving directions and stating limits clearly in order to avoid group confusion. Play the game as teacher and students first. Then let the students play the game with each other. 1. Select a simple picture that the students in the class have not seen. They are to draw the picture as you give verbal directions. They are not to see the picture. No gestures may be given with the instructions and no questions may be asked or answered. 2. At the end of the exercise, compare the students' pictures. Note how different each is even though each student heard the same directions.
Techniques for working cooperatively supervising groups of preschoolers	Simulation: Use the small group build-up activity with the entire class group. Stress the need for a mutually-agreed upon solution, not one suggested by the most vocal member of the group. Through participation in the activity, students should gain an understanding of the problems experienced by members of a group in working together cooperatively. It should also help set the stage for later group cooperation. 1. Give the entire class a single problem to solve. It could involve you, themselves as a class, their work with the children, the student organization -- FHA/HERO. 2. Pair students up with someone they don't know well. The pairs are to reach an agreement on a solution to the problem. 3. Have each pair join with another pair, making a group of four, to work on combining their two separate solutions into one. 4. The groups of four are to join together making groups of eight. The groups of eight must reach a consensus on a solution to the problem.

II. Presentation:

CONCEPT	CLASSROOM ACTIVITIES
	5. Each group selects a recorder to report to the rest of the class on how decisions were reached and what problems were encountered in reaching a solution acceptable to all.
	6. Discuss the strengths and shortcomings of this method in group cooperation in contrast to other ways of making a group decision.

III. Application:

Have the students complete Skill Builders on Student Assignment Sheet individually or as a group.

ASSIGNMENT SHEET

Science Concept: Supervision

Task: Control Groups of Preschool Children

Why learn this?

In a realistic preschool setting, you will be responsible for 5 to 20 children depending on the age group with which you work. Knowing how to handle a group of children will make your job easier and much more fun. It will cut down the frustrations you feel and will make the learning situation a happier one for each child.

Principle Emphasized:

Behavior is the result of action and reaction.

Words to Know:

Consistent	Cooperate
Compensate	Supervision
Communicate	

Resources: Information Sheet - Group Control in Preschool

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1. Read the information sheet.
2. Complete Skill Builder - Words to Know
3. Complete Skill Builder - Handling Problem Behavior
4. Complete Skill Builder - Group Control

INFORMATION SHEET

GROUP CONTROL IN PRESCHOOL

Most children who come to preschool will be facing their first group situation outside of the family. This is the number one reason why parents send their children to nursery school. There are several steps which children usually go through in adjusting to the preschool group. The child will first relate to an adult and learn to feel safe and secure with that adult. The next step will be relating to another child and finally, becoming a part of the group.

You can help the shy or insecure child by sitting with the youngster during play and gradually introducing another child into the activity.

It is difficult for a child to conform to the demands of the group and still maintain a sense of self. The child wants to be an individual as well as a member of the group. This sometimes creates frustrations which lead to inappropriate behavior. Remember that the behavior results from the child's need to:

1. Feel important
2. Receive attention or recognition
3. Prove abilities or compensate for weaknesses

Effective control techniques must be addressed to these needs.

Techniques of Group Control

There are a variety of skills to learn for group control that will prevent problems and make your job easier. Pay attention to the way you work with children. Practice these skills every time you have an opportunity.

Preplanning

1. Have materials for the children's activities ready ahead of time to prevent waiting and restlessness.

2. Be sure the area is large enough for the activity and the number of children who will participate.

3. Separate activities by creating physical barriers to help avoid distractions and interruptions.

4. Plan activities that are appropriate for the children's age and ability level.

5. Separate children who seem to have problems when they are together.

Setting Limits

1. Set limits, give directions, and be sure that the children understand what is expected of them.

2. Explain why limits have to be placed on behavior.

3. Set only limits that are really necessary. Too many are hard to remember and may cause more problems than they solve.

Actions with the Children

1. Be enthusiastic; use your voice as a control device.
2. Stand near the child who may need control; your nearness is a strong influence.
3. Compliment the child who is doing what you want the others to do.
4. Respond to the individual having the problem, not to the entire group.
5. Be consistent; let the children depend on your behavior and responses.
6. Be prepared with another activity and change to it when you see the children's interest lagging.

SKILL BUILDER

WORDS TO KNOW

Directions:

Define the following words.

1. Consistent____

____

____

2. Compensate____

____

____

3. Communicate____

____

____

4. Cooperate____

____

____

5. Supervision____

____

____

SKILL BUILDER

HANDLING PROBLEM BEHAVIOR

You can identify problems in supervising a group of children through observations of activities in the preschool. We will discuss the reasons for the problems and share ideas for solutions. The purpose is to help you become aware of the variety of viewpoints and the need to reach some agreement on how to handle situations so that children experience consistency from the adults who help them.

Directions:

1. Observe the preschool for 15 minutes during group activities. Identify situations where 1 or more children disrupt the group. State what the child does and which basic need(s) you feel he or she is trying to satisfy. Record observations individually on the Group Activity Observation Sheet. You should identify:
    a. The point at which a problem begins
    b. The child or children who create the disruption
    c. Ways in which the situation might have been prevented
    d. Ways in which the situation might be solved or managed
2. Ask a spokesperson for each group to report the situation and solutions to the class.
3. Summarize the suggestions into "best" solutions. Why is it important to arrive at an agreement on the way to manage the children's behavior?

Name_____

Date_____

GROUP ACTIVITY OBSERVATION SHEET

Activity_____

Problem_____

1. When did the problem begin?

_____ During pre-activity transition
_____ During directions and limits
_____ During the main activity
_____ At the conclusion of the activity

2. Names of children involved in the disruption

_____ _____ _____
_____ _____ _____
_____ _____ _____

3. Check the areas where you feel closer attention to detail might have prevented the problem.

Pre-Planning

_____ Area proper size
_____ Materials ready
_____ Eliminate distractions
_____ Appropriate activity
_____ Separate children

Setting Limits

_____ Set limits/give directions
_____ Tell why
_____ Only necessary limits

Techniques

_____ Be enthusiastic
_____ Stand near child
_____ Emphasize appropriate behavior
_____ Respond to individual
_____ Be consistent
_____ Change activity when necessary

4. How might the situation have been solved or managed better?

_____
_____
_____
_____
_____

SKILL BUILDER

GROUP CONTROL

Directions:

Plan a new game for a group of children. Establish all rules and decide on any limits which must be set. Present the game to a group of your classmates asking them to follow your directions exactly as given. Review the "Techniques of Group Control" listed on the Information Sheet. Determine your own needs for improvement in pre-planning with the help of your classmates. Revise the game.

Present the game to a group of preschoolers. Ask a classmate to evaluate your techniques of group control using the Group Control Evaluation Sheet. Summarize your areas of strength and needs for improvement.

Name______________________________

GROUP CONTROL EVALUATION SHEET

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May
Pre-Planning								
1. Area proper size								
2. Materials ready								
3. Eliminate distractions								
4. Appropriate activity								
5. Separate children								
Setting Limits								
1. Set limits/give directions								
2. Tell why								
3. Only necessary limits								
Actions with Children								
1. Be enthusiastic								
2. Stand near child								
3. Emphasize appropriate behavior								
4. Respond to individual								
5. Be consistent								
6. Change when necessary								

a bird's eye view

LISTENING IS A SKILL

Understand this behavioral science concept:

Listening is a skilled activity that can be learned and refined.

Teacher Materials
Information Sheet
Sample Lesson Plan

Student Materials

Assignment Sheet:	Develop Listening Skills
Information Sheet:	Listening Skills
Skill Builders:	Listening Word Puzzle
	Audiometer Your Hearing

TEACHER INFORMATION SHEET

Understand this behavioral science concept:

Listening is a skilled activity that can be learned and refined.

Listening is an acquired skill. It is essential for good communication. To be a good listener requires concentration and thinking.

To encourage good listening habits, the classroom teacher should keep in mind the following guidelines to share with students:

1. Give instructions only once so that children become trained to tune in the first time. Try not to repeat instructions.
2. Use a quiet, normal voice which provides a good model and requires closer listening than a loud demanding tone.
3. Give short, concise, clearly stated instructions or explanations. Children (and adults) tend to tune out long, rambling, unclear ones.
4. Use a moderate rate of speech which is easier to follow than a rate which is too quick or too slow.
5. Listen attentively when a child speaks to you. Again, this serves as a good model for what the child is to do.
6. Be certain you have the child's attention before you begin your directions. Use eye contact to verify attention. If necessary, black out visual distractions from the child's view when speaking.
7. Create quiet, calm surroundings which provide the most conducive environment for the development of listening skills.
8. Use a sound clue or carrier phrase such as "ready" or snap your fingers to alert the child to "tune in." Be consistent with this clue and gradually phase it out.

Janet Lerner, Carol Mardell-Czudnowski, Dorothea Goldenberg, *Special Education for Early Years*, (Prentice-Hall, Inc., 1981).

SAMPLE LESSON PLAN

Science Concept: Communication
Task: Develop Listening Skills

Objective: The student will be able to:

1. Explain the importance of good listening skills
2. List ways to improve their own listening skills

Teaching Aids:

Sound Discrimination Worksheet

I. Preparation of the Learner:

Place students in a circle, either at desks or seated on the floor. Then tell them they are going to be doing this activity exactly as you do, so they must watch and listen closely.

1. Casually clear your throat or cough-- whichever is the major factor you are going to expect them to copy to be correct.
2. Then say:
   a. "There's a moon up in the sky " (In the air pretend to draw a big circle with your index finger, moving top to left)
   b. "It has two eyes " (Make two dot motions with two fingers)
   c. "A nose " (Make another dot)
   d. "And a mouth" (Make a curved line for the smile)
3. Have the student to your right copy your exact motions and sounds. If the student does it exactly right, you give super praise; if not, just signify by a head gesture, "no," and move on to the next student.
4. Those who copy you exactly right will gladly repeat it as your model.
5. Keep going around the circle until students all are correct or until you have used the allotted time.

II. Presentation:

CONCEPT	CLASSROOM ACTIVITY
Sound discrimination	Sound Discrimination Worksheet - Tape record sounds and play back to students. Have them listen and complete the worksheet. The purpose of the activity is to make students aware that qualities of sound make sounds different from each other. Attention to detail can help students learn to make better discriminations. (See attached worksheet) Clap a Name - The purpose of this activity is to emphasize rhythm in sound discrimination. 1. Have each student clap once for each syllable in their name in the same rhythm that their name is said. It will help to say the name out loud as it is clapped the first time. 2. Have a volunteer clap the name of a classmate; the rest of the students try to guess the name. Several students may have names with the same rhythm. This makes guessing more difficult. It is also fun to find names that have the same rhythm in common.
Listening cues	Black Magic Game - The purpose is to help students tune in to a process that is the clue to always giving the right answer. 1. One person is selected to leave the room and to be "It." 2. The leader has the group select a blank object. If it is difficult to find a variety of things in the room that are black, select another color and alter the name of the game to Red Magic, for instance. 3. The person playing "It" is asked to return. 4. The leader points to a variety of objects in the room asking questions such as, "Is it this?", "Could it be the ___________?"

II. Presentation: (Cont'd)

CONCEPT	CLASSROOM ACTIVITY
	5. When the leader is ready for the person playing "It" to discover the object, the leader must use that as part of the phrase, "Is that the object?", "Is it that?" 6. The rest of the class must attempt to find out how the correct object is discovered. 7. Volunteers may wish to try being "It." The leader must tell them the clue statement privately. After the player knows the clue, he or she can pick out the correct object the class chooses every time, and continue to let them guess how it's done.

III. Application:

Have students complete Skill Builders on Student Assignment Sheet individually or as a class.

SOUND DISCRIMINATION WORKSHEET

Directions:

Listen to the tape recorded sounds prepared for this activity. Identify the qualities that apply to each sound.

SPECIFIC SOUND	PITCH (highness or lowness)	TEMPO (fastness or slowness)	RHYTHM (regularity of flow, beat)	VOLUME (loudness or softness)
Ex. Doorbell	2 Medium Tones	--		
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				

ASSIGNMENT SHEET

Science Concept: Communication

Task: Develop Listening Skills

Why Build Skills in Listening?

Have you ever been upset because you misunderstood what someone else has said? Perhaps it was because you did not receive the message as it was sent or there was interference in listening. To follow through correctly, we need to know what the sounds are that we receive and what they mean. Most education is transmitted through language which has to be heard. In order to follow directions, a student needs to hear accurately, and be able to skillfully carry out commands in a prescribed way. People who are most effective with others take time to listen to them.

Principle Emphasized:

Listening is a skilled activity that can be learned and refined.

Words to Know:

- Auditory Awareness
- Discrimination
- Hearing
- Interference
- Isolate
- Listening
- Misinterpret
- Misunderstand
- Noise
- Pitch
- Rhythm
- Sound Perception
- Tempo
- Transmitted
- Vocabulary
- Volume

Resources: Information Sheet - Listening Skills

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1. Read the resources.
2. Complete Skill Builder - Listening Word Puzzle
3. Complete Skill Builder - Audiometer Your Hearing

INFORMATION SHEET

LISTENING SKILLS

Why Listen?

One by one we listened to the words of our childhood and grew a vocabulary of language. Listening is truly one of the most vital tools of learning and of getting along with others. Listening enriches our lives in many ways. There's the pleasure and appreciation of music and spoken language in songs, stories, and poetry, as well as the enrichment of conversation with others.

When you are the speaker you wish to be heard, because you have something worthwhile to say. If you are the listener you must hear, not just the words, but the meanings of those words. You must concentrate to be able to understand. Through listening you learn daily from others. You must not tune out what is important to the other person if you truly desire to get along and build a feeling of cooperation. False impressions result if one haphazardly listens.

Hearing is the sense through which the body receives sounds. Sounds are relayed as impulses in the auditory nerves. The impulses are carried to the brain and decoded. When the messages are received correctly, the listener is said to have auditory awareness or sound perception. This means that the person hears and knows what has been heard. At times there are numerous unorganized sounds occurring at once which make it difficult to recognize or isolate any one sound. This is called noise. The ability to separate one sound as different from others is called sound discrimination.

The quality of listening may be affected by such conditions as deafness or hearing impairment, illness, fatique, hunger, and the quality of the physical environment. The ability to listen appears to have a great effect on the development of socially accepted behavior.

There are three basic types of listening skills:

1. Discriminative listening to gain information such as in following directions
2. Critical listening to evaluate ideas and form values and judgments
3. Appreciation listening of music or other sound which is pleasing to the listener

SKILL BUILDER

LISTENING WORD PUZZLE

Listening Words:

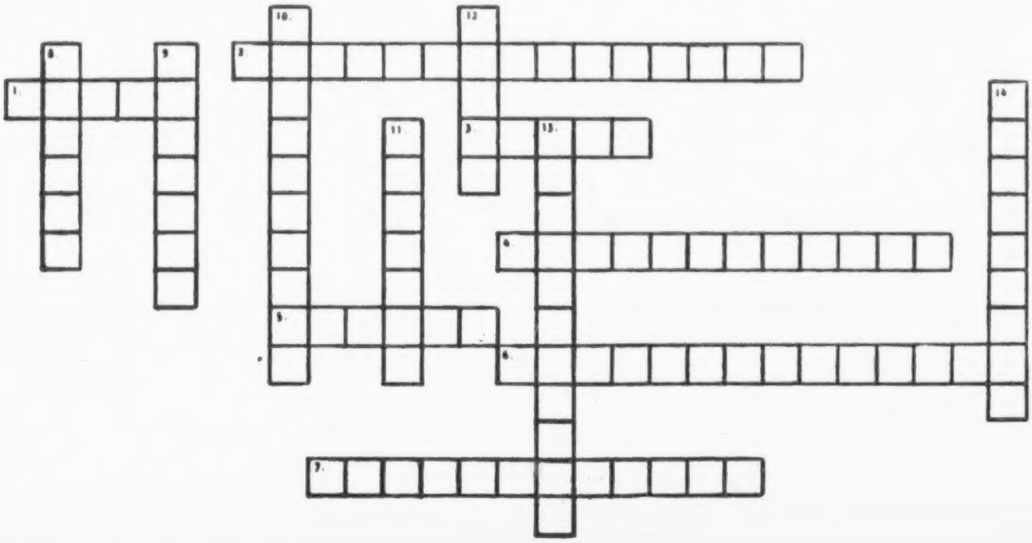
Auditory Awareness
Discrimination
Hearing
Interference
Isolate
Listening
Misinterpret
Misunderstanding
Noise
Pitch
Rhythm
Sound Perception
Tempo
Transmitted
Vocabulary
Volume

Across:

1. Numerous unorganized sounds at once
2. Another name for auditory awareness, to hear and know what is heard
3. Highness or lowness of sounds
4. Something that disrupts the normal situation
5. Regularity of the flow of sounds, beat
6. The process of separating or identifying something as different
7. To take the wrong way or misunderstand

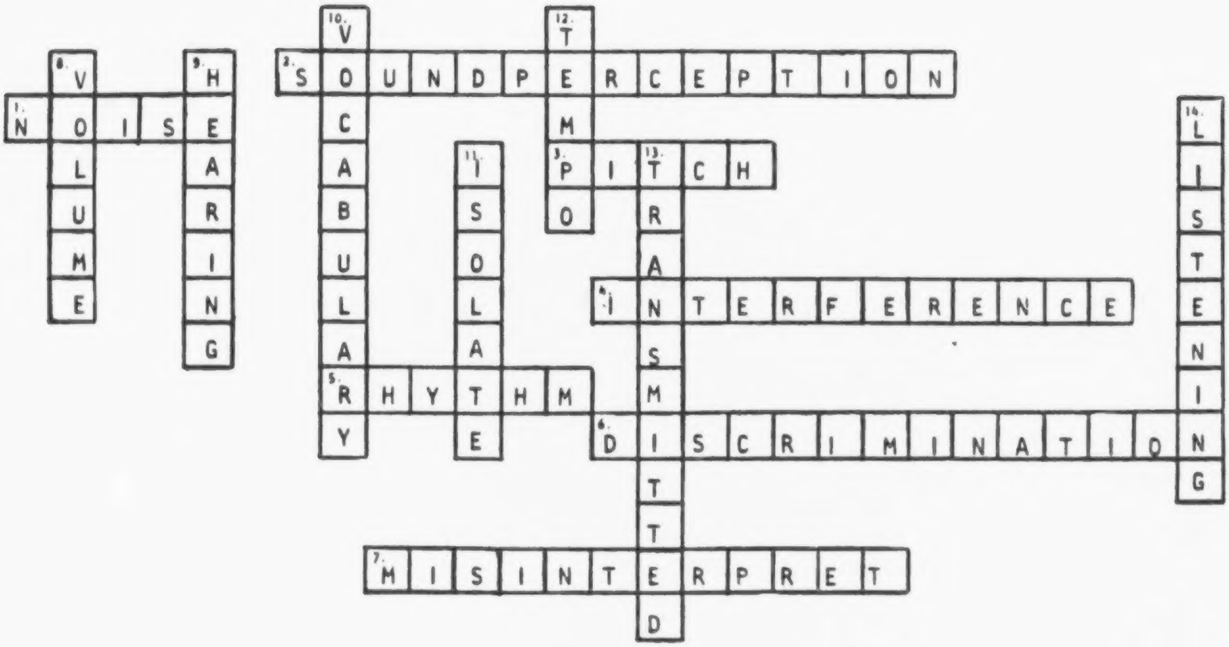
Down:

8. Loudness or softness of sounds
9. The sense through which the body receives sounds
10. An accumulation of words used and understood
11. To separate or single out by itself
12. Fastness or slowness of sounds
13. Message sent
14. Hearing and adapting to what is previously known



LISTENING WORD PUZZLE

ANSWER KEY


1. NOISE
2. SOUNDPERCEPTION
3. PITCH
4. INTERFERENCE
5. RHYTHM
6. DISCRIMINATION
7. MISINTERPRET
8. VOLUME
9. HEARING
10. VOCABULARY
11. ISOLATE
12. TEMPO
13. TRANSMITTED
14. LISTENING

SKILL BUILDER

AUDIOMETER YOUR HEARING

Directions:

Secure an audiometer. Test another student's hearing ability. Checksheets for individual evaluation of hearing may be obtained from the same place as the audiometer. Some school systems own these devices. They may also be obtained through most county health departments or from a hearing specialist. List your personal problems in listening. Develop purposeful plans to improve them. Through individual conferences, discuss your progress with your teacher.

Problems in Listening:

Plans to Improve:

a bird's eye view

NON-VERBAL MESSAGES

Understand this behavioral science concept:

Attitudes and feelings are conveyed through non-verbal communications.

Teacher Materials
Information Sheet
Sample Lesson Plan

Student Materials

Assignment Sheet:	Communicate with Gestures
Information Sheet:	Communicating with Non-Verbal Messages
Skill Builders:	Words to Know Actions Speak Comparison Worksheet

TEACHER INFORMATION SHEET

Understand this behavioral science concept:

Attitudes and feelings are conveyed through non-verbal communications.

MUCH OF WHAT WE COMMUNICATE IS NON-VERBAL

Non-verbal communication is conveying meaning without words. It includes:

- Gestures
- Facial expressions
- Body posture
- Tone of voice
- Physical attributes
- Many others

This form of communication is learned. The skill develops through imitation, practice, and the interaction of thought and speech processes.

Facial expressions are the source of much of the communication that goes on between people. In particular, the face is often used to express emotional feeling. Emotions often communicated by facial expressions are:

- Feedback on comments of others
- Anger
- Resentment
- Happiness
- Sadness
- Depression
- Surprise
- Fear
- Disgust
- Interest
- Determination
- Hate
- Doubt
- Arrogance
- Love
- Anticipation
- Annoyance
- Intelligence

A person can learn to be proficient in controlling facial expressions. When one becomes aware of the communicative potential of the face, it can be monitored - inhibiting and exhibiting when desired.

SAMPLE LESSON PLAN

Science Concept: Communication
Task: Communicate with Gestures

Objective: The student will be able to:

1. Describe some of the impressions relayed by gestures
2. Identify appropriate and inappropriate non-verbal behavior and attitude signals
3. Recognize their own gestures, analyze them, and make a plan for changing those which need to be modified
4. Use a plan for behavior change and evaluate personal progress

Teaching Aids:

Deck of cards for each student
Guidesheet for card game
Sign - NO TALKING TODAY
Yardstick
Construction paper - four colors
Scissors
Direction sheets for "Build a Tower"

I. Preparation of the Learner:

Read story "Mysterious Max"

II. Presentation:

CONCEPT	CLASSROOM ACTIVITIES
Gestures that send non-verbal messages	Brainstorm: Non-verbal Clues
Non-verbal communication of attitudes and feelings	Card Game: Guess the Message
Non-verbal clues to behavior	Experiment: Handshake Non-verbal Game: Build a Tower

III. Application:

Have the students complete the Skill Builders on the student Assignment Sheet individually or in groups.

MYSTERIOUS MAX

Once upon a time there was a retired farmer named Murry Miller who owned a German shepherd dog named Max. Having a great deal of time on his hands, Murry decided to teach Max a variety of tricks beyond the ordinary doggy maneuvers of sitting up, rolling over, and begging. Max was very smart and rapidly learned from his master. Before long he could add and subtract numbers and give the right answer by pawing the ground with a front foot. He even learned to multiply and divide with skill. He also mastered spelling by using a code of one bark for A, two for B, and so forth.

Murry had some friends drop in for a visit one day and showed off Max and his skills. Soon everyone heard bout Mysterious Max and come from all over to see him do his tricks. Word rapidly reached a nearby university. Professors there became excited because it seemed as if Max were as smart as a human being and could think the way we do. It was unheard of for a dog to do these things and many wise people who held theories about man being of superior intelligence were upset.

Direction to Teacher:

1) Stop! Discuss how animals are able to respond to commands of humans or how they seem to receive the message and perform.

2) Reach an agreement on the definition of communication.

3) List examples of the communication that goes on between animals and humans -- dogs seem to sympathize, fetch things; dolphins and birds do tricks, etc.

4) Discuss their use of sounds as a form of communication.

5) Try to conclude why Max is able to perform.

The crowds grew and grew. Max gave daily performances. Then some people tried to find out if they could mix up Max and establish that it was all a trick. Murry was even sent out of the room as tests were conducted. Being unsuccessful, they were astonished and went away convinced that Murry and Max were not cheating. Finally one professor had an idea. He sent everyone out of the room and stood behind a screen where Max could not see him. He asked the question, "How much is 12 x 3?" Max started to paw the ground,but when he should have stopped at 36 he kept on. He didn't know when to stop. The mystery was solved.

Max had not become stupid, nor had he forgotten anything. Max was very bright. He had become clever at noticing what people did. When you know the right answer and someone gets close with guesses,you give off signals of anticipation with your facial expression, your voice,and even the way you hold your hands. At first, when his master looked pleased and gave other cues he stopped. Then he transferred this to other people. He received his doggy treat rewards so he was eager to repeat the trick. This time be became confused when he had no eye contact or signals to go by. This is an example of how we communicate with our bodies or use gesturing skills.

CARD GAME: GUESS THE MESSAGE

Materials Needed:

Guide sheet with rules and non-verbal signals or emotions

One playing card deck for each group

Game Versions:

Each card in the playing deck represents one of the following emotions or signals:

Version 1			Version 2		
Card		Emotion	Card		Signal Messages
2	=	Shyness	2	=	See, I told you so!
3	=	Fear	3	=	Don't bother me with that!
4	=	Loneliness	4	=	Go jump in the lake!
5	=	Disappointment	5	=	Get off my back!
6	=	Anxiety	6	=	Now, that's really clever!
7	=	Happiness	7	=	It's my turn on the phone!
8	=	Grief	8	=	Well, darn it anyway!
9	=	Anger	9	=	I really dig that!
10	=	Peacefulness	10	=	Well, isn't that a fine fix!
Jack	=	Boredom	Jack	=	I'm terribly disappointed in you!
Queen	=	Anticipation	Queen	=	Now, just look here!
King	=	Excitement	King	=	Cool it kids!
Ace	=	Love	Ace	=	In one ear and out the other!

Procedure:

1. Divide the group into teams of 4 to 6 people.
2. Shuffle the cards and decide which game version to use.
3. Deal out all but about 5 cards for the draw pile so everyone has the same number of cards.
4. Get rid of your cards by correctly role playing or guessing the gestures used by other players to express the emotions in Version 1 or the signal messages in Version 2.
5. The first person to get rid of all cards is the winner.

To Begin:

1. Player to the left of the dealer begins by selecting one (or more cards) from his or her own hand.

BRAINSTORM NON-VERBAL CLUES

Directions:

List all the ways you personally communicate without words. Describe some of the motions and gestures you use, and explain what each means.

2. The card is laid on the table face down.

3. The player, without words, acts out the emotion or signal message to represent that card.

4. When the other players think they recognize what is being acted out, and also have the correct card, they are allowed to lay the card face down on the table in front of themselves.

5. To check, all cards are turned face up at the same time. Those that match the actor's card are collected and placed on the bottom of the draw pile. If no one matches, the actor did a poor job of communicating so the actor must take the card back and draw from the draw pile. Those with wrong guesses must also draw a card. If players put two or more cards down that seemed to match, then the same number must be drawn to replace the originals in their hands.

HANDSHAKE

Divide the class into small groups. Select a leader to go through the groups giving each person a handshake. The leader will use a different approach of the formal handshake with each group. The group members are to write their first impression of the leader's handshake.

Group 1 - dead fish or cold limp handshake
Group 2 - extra firm political handshake squeezing only the student's fingers in your hand
Group 3 - a good, friendly, firm handshake

Collect the papers to see what the groups' first impressions were. Tell the class what techniques the leader used with each group. Students may show the other groups what the handshake was like. The students may find they need practice with the handshakes.

Handshake:

1. Types of Handshake
    - a. Formal or Traditional
    - b. Informal or Modern
2. Use of Types of Handshakes
    - a. There is a place for each.
    - b. Decision must be made quickly and correctly as to which to use.
    - c. Incorrectness can cause embarrassment and a loss to the individual.
3. Correct Formal Handshake
    - a. Firm but not too firm.
    - b. Young women may also use a handshake.
    - c. Make the handshake a part of you.
    - d. Males normally wait for the lead from the female.
    - e. Do not make the handshake too short or too long in duration.
4. Correct Informal Handshake
    - a. Firm but not too firm.
    - b. Make sure the situation is right for the use of an informal handshake. When in doubt as to the use of an informal handshake, use the formal.

BUILD A TOWER

Introduction:

This is fun for everyone if everyone enters into it, including the teacher. Directions are given in written form only with no additional written messages and absolutely no speech. It will help the students to know the time allotted for the activity before starting. There will be groups of students divided into teams compete to see which team can build the highest tower of paper squares.

Materials Needed:

1. A sign NO TALKING TODAY, posted at entry
2. A pointer or yardstick
3. Two-inch squares of colored construction paper in at least four colors - red, blue, green, and yellow - with ten squares per student plus a few extras
4. Scissors - one per team
5. universal direction sheet, one per student
6. individual directions, each different, one per student

Universal Directions:

Give out direction sheets as students come in the door. The sheet should be headed YOU MAY NOT SPEAK!

There are to be no changes in these directions or the individual directions you will find turned over on the top of your desk.

1. Find your individual directions. Read it. Put your name on it and stuff it into your shoe, but let no one else see what it says.

2. Without talking, locate your team and decide where to work.

3. Everyone should obtain their own individual supplies from the teacher's desk and join their team area.

4. With your team only, build the highest possible tower using the colored squares and one pair of scissors.

Individual Directions:

1. Head each set of papers with Team I, II, III, or IV. Teams should have an equal number of members.

2. Add one of the following statements, making sure no two individuals on the same team have the same directions.

   a. "Build up with yellow and across with yellow"
   b. "Build up with red and across with red"
   c. "Build up with red and across with blue"

d. "Build up with blue and across with red"
e. "Build up with green and across with yellow"
f. "Build up with yellow and across with green"
g. "Build up with green and across with blue"
h. "Build up with blue and across with green"

Teacher's Role:

1. Allow time for students to figure out their teams and places to work. If they can't, then help guide them by holding up one finger for Group 1 and pointing to a particular corner of the room. Two fingers for Group 2 and so on.

2. If students have difficulty starting to build, show two methods:

   a. Folding the squares
   b. Making tiny slits to link paper squares together

3. Once students get going, take the yardstick around the room and measure the towers to show comparisons. Praise by giving pats to those who have succeeded at that stage.

4. Using motions, remind students of the time left. When time is up recognize the most accomplished team.

5. Be flexible in enforcing the non-speaking rule, but have a plan made for dealing with constant offenders.

6. Be sure to follow up with a short discussion of motions used to communicate and feelings experienced while working.

ASSIGNMENT SHEET

Science Concept: Communication

Task: Communicate with Gestures

Why Use Appropriate Gesture Skills?

Many times in our daily lives we are required to manage our emotions. We have to control facial expressions on the job, as well as other motions of the body, or we may be revealing feelings and attitudes that are likely to lose patrons. Actions speak. Silent communication carries an impact in relationships. Our reactions show our sensitivity or insensitivity to others. Quite often people are attracted to the outgoing friendly person while they are drawn away from those with unfriendly signals. You can change the attitude of others toward yourself if you are willing to practice skills that convey other meanings. Make them a natural part of yourself.

Principle Emphasized:

Attitudes and feelings are conveyed through non-verbal communications.

Words to Know:

Atmosphere
Body Carriage
Enthusiasm
Eye Contact
Facial Expression
Gesture

Handshake
Impression
Paying Attention
Posture
Reprimand
Steepling

Tantrum

Resources: Information Sheet - Communicating with Non-Verbal Messages

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1. Read the resources.
2. Complete Skill Builder - Words to Know
3. Complete Skill Builder - Actions Speak
4. Complete Skill Builder - Comparison Worksheet

INFORMATION SHEET

COMMUNICATING WITH NON-VERBAL MESSAGES

The earliest human communication is relayed from the parent to the child through touching and tender loving care. For some time, a baby responds with cries, smiles, and squirms of body language which are prespeech forms. Gestures are movements of the body and limbs which serve as supplements to speech or are substitutes for it. Children, as they gain more speech, transform early gestures into words. In some cultures, talking with hand motion accompaniment is considered bad taste. In one African country, pointing is done with the tongue rather than with fingers.

Grooming and Dress: Strong, non-verbal signals are sent to others by the clothes you choose to wear. Proper clothing varies greatly from beach, to church, to school. Clean uniforms inform the customer that this is likely to be a sanitary place to eat. The employee appears to care about personal appearance, so the employee is probably going to give the type of restaurant service desired. Disorderly, messy clothing suggests that one is disorderly and messy about their job as well.

What kind of signals are sent by inappropriate clothing? Perhaps someone wants undue attention no matter what must be done to get it. Maybe the employee really does not know what appropriate clothing is for the situation or maybe he or she just doesn't care. If the problem is not caring about grooming and dress, the observer is likely to assume that the same attitude will carry over to the job. Most employers will not stand for this, so this kind of person probably will have difficulty obtaining a job or keeping it.

Eye Contact: Most people prefer eye contact when talking with someone. It says, "I care what you are saying," and indicates that the person is paying attention. It also suggests a quality of honesty and sincerity. It is very desirable to seek the same eye-to-eye height level when talking about things of a serious nature. Children respond better to adults who kneel to speak with them. Short people are usually very self-conscious of their height. Tall people aware of this sensitivity would try to equalize heights.

General Gestures and Movement: There are positive movements and those considered negative or inappropriate. Positive movements are a pat on the shoulder for a good job, a nod or wave as greeting, a smile, a wink, taking someone by the hand, and even pats to the seat as football players do. A relatively relaxed use of the body and a pleasant facial expression, unrushed, produce a relaxed atmosphere.

"Sh-h-h-h-h," with a finger to the mouth is a signal to be quiet. Hands up signals quiet, as the school bus approaches the railroad tracks. There is a glare with cowered eyebrow movements that means, "Stop that at once." Raising the eyebrows means, "What do you want?" Shoulder shrugs often mean, "I don't know." Head shakes up and down mean "yes," and sideways mean "no." Crossed arms or legs may signify, "I'm not open to your ideas."

Rolling eyes and sighing usually signal a negative emotion. Making faces, angry looks, grabbing things, stiff body jerks with other quick movements, and up-tight posture signify stress. Yawns, leaning on hands while listening, and slouching posture tell others "This person is bored." Fast gum chewing with popping, nail-biting, and hair twisting along with advanced-age enuresis (bedwetting) and thumb-sucking are symptoms of nervousness. Tantrums may involve door slamming, hitting something, or stomping of feet to show immature, uncontrolled anger.

Body carriage, the way one walks and stands, tells others a great deal about what one thinks of themself. Even the chair you choose in class when given a choice tells the teacher, "I want to listen," in front or "I'm not prepared to participate today," in the back.

Twiddling of thumbs or "steepling" the hands in a prayerful position are gestures unique to some people when thinking. We use positive finger signs for "Okay," and thumbs up for approval. There are also inappropriate finger signs that are in the same class as swearing. Small children are taught action poems with finger movements to develop coordination as well as a means of non-verbal expression.

Handshakes can tell others, "I want to get to know you," by being enthusiastic, or, "I could care less," if of the dead fish variety. There are secret handshakes and motions in many organizations that are only meaningful to their members.

Gestures create lasting impressions in those that observe you whether at home, in school, or on the job. Be sure you are sending the signals you want received.

SKILL BUILDER

WORDS TO KNOW

Directions:

Match definitions with the vocabulary by placing the letter in the blank before the appropriate word. Use a dictionary to confirm the meanings.

Vocabulary	Definitions
_____ 1. Gestures	a) Listening and involved
_____ 2. Facial Expressions	b) Contact between two bodies
_____ 3. Posture	c) Body movements that mean things to others
_____ 4. Body Carriage	d) Showing disapproval
_____ 5. Touching	e) Motions with fingers
_____ 6. Paying Attention	f) Showing excitement
_____ 7. Eye Contact	g) The way one walks
_____ 8. Finger Signs	h) Performance for attention when one doesn't get their way
_____ 9. Handshakes	i) Clothing you wear
_____10. Reprimand	j) Lasting thought of a person or situation
_____11. Enthusiasm	k) The way one stands or sits
_____12. Tantrums	l) General feeling or mood
_____13. Impressions	m) The movements of the face
_____14. Atmosphere	n) Looking into each other's eyes
_____15. Steepling	o) Greeting by taking one another's hand
_____16. Attire	p) Prayerful hand motion while thinking

Key:

1. c	5. b	9. o	13. j
2. m	6. a	10. d	14. l
3. k	7. n	11. f	15. p
4. g	8. e	12. h	16. i

SKILL BUILDER

ACTIONS SPEAK

Directions:

Think carefully! We are exploring all of the possible ways of gesturing or using our bodies to convey a meaning to others. Write a word for each of the letters below. The letter must be a part of the word but need not be the first letter.

EXAMPLE: Smile may be placed for an "E" word or an "S" word.

____________________ G ____________________

____________________ E ____________________

____________________ S MILE ________________

____________________ T ____________________

____________________ U ____________________

____________________ R ____________________

____________________ I ____________________

____________________ N ____________________

____________________ G ____________________

Create others if time allows.

You speak through your movements and mannerisms. Help yourself be a good friend and a valuable employee.

SKILL BUILDER

COMPARISON WORKSHEET

Directions:

Identify ways individuals communicate attitudes and feelings both verbally and non-verbally for the same situations.

Write a Definition for:

1. Verbal:
2. Non-Verbal:

List two or more ways you speak and signal to others for each situation below:

	VERBAL	NON-VERBAL
Greetings		
Departure		
Affection		
Praise		
Disapproval		
Come to me		

a bird's eye view

POSITIVE LEARNING ENVIRONMENT

Understand this behavioral science concept:

A positive learning environment results in social, emotional, and physical growth of the preschooler.

Teacher Materials
Information Sheet
Sample Lesson Plan

Student Materials
Assignment Sheet: Establish a Positive Learning Environment
Information Sheet: Establishing a Positive Learning Environment
Skill Builders: Words to Know
Personal Qualities Rating Sheet

TEACHER INFORMATION SHEET

Understand this behavioral science concept:

A positive learning environment results in social, emotional, and physical growth of the preschooler.

TYPICAL FUNCTIONS OF MATERIALS

If one investigates the typical materials found in early learning settings, a high level of consistency is apparent. By providing an array of materials, the child is afforded a range of opportunities for developing and expanding a repertoire of skills and concepts. The child is encouraged to manipulate and explore these materials in a variety of ways, and it is often assumed that he or she will learn as a result of this interaction. In most cases, specific materials are viewed as having uses or learning potentials that correspond to to certain areas of concept development and/or subject matter.

Blocks are a standard item found in early education programs. They are viewed as useful and important because they provide the child with opportunities to do things that promote the acquisition of certain skills. Those most frequently mentioned are mathematics, spatial relationships, and motor coordination. In addition, block play is viewed favorably because the child has a high degree of freedom to define and structure his or her own activities with the blocks.

Books and other language stimulating materials are useful because the child is given opportunity to develop further linguistic and pre-reading skills. Language experience materials serve to stimulate visual and auditory discrimination, receptive and expressive language, and communication skills. Although books are the most common materials found in language centers, such items as felt boards, tape recorders, alphabet blocks, and puppets are often provided and used in a variety of ways. Language materials of this sort can be used effectively in child-directed or teacher-directed activities. In addition, they are of value in both formal and informal learning sessions.

Tabletop manipulative materials such as puzzles, sorting boxes, parquetry blocks, jars, and lids, serve several important functions. First, they provide the child with m any opportunities to develop and expand such concepts as color, shape, size, pattern, and order. They necessitate the use of perceptual motor skills, such as eye-hand coordination, visual discrimination, and tactile sensitivity. Frequently children will engage in quiet, self-directed learning activities that are either self-correcting or open-ended in nature. Manipulative materials are also valued because they involve the child in the kinds of skills and thinking that provide the foundation for the development of reading, writing, and mathematical operations. They also provide the child with gratifying, successful experiences.

Art and modeling materials lend themselves to psycho-sensory experiences, self-expressive activities, and representational thinking. Such materials as crayons, tempera paint, finger paint, clays and doughs, and a variety of collage materials are standard items found in most early education environments. They are important because of their aesthetic qualities and because they provide freedom within which many concepts can be explored.

Housekeeping corners or centers generally contain a variety of household items such as furniture, eating and cleaning utensils, and clothing. They provide the child with the implements needed to engage in imitative and symbolic play. Because these materials are familiar to every child, they provide even the reluctant child with a sense of the familiar. A variety of roles and behaviors can be experienced by the child in using these materials with the result that understanding of self and others is expanded. Exploration of social roles, family roles, and sex roles is naturally encouraged by providing housekeeping materials. In addition, language, motor skill, and cooperation often become an integrated part of activities involving these props and materials.

Sand and water are widely used as learning materials in early education settings. The free-flowing qualities of sand and water seem to catch and hold the attention of most young children. Both types of materials encourage the child to explore and think about physical qualities and concepts. As children manipulate sand or water, they can be engaged in basic scientific processes or the elaboration of dreams and fantasies. The calming and soothing qualities of sand and water are often attractive to children and teachers alike. It is not uncommon for the sand or water table to be the msot often used resource in the entire learning environment.

Music materials which include records, instruments, and songs are worthwhile in developing rhythm, balance, and appreciation for music heritage.

Science materials, including living and non-living things, can be the basis for a host of learning activities involving manipulation, observation, and recordkeeping.

Cooking and nutrition-oriented activities can also be a basis for science projects. In addition, they can be related to the daily activities of cooking and eating.
Motor skill materials or equipment are extremely important. They include a variety of apparatus that encourage the child to use all parts of the body in developing strength, coordination, and body awareness.

Barry Persky & Leonard Golubchick, Early Childhood Education, (Avery Publishing Group, Inc., 1977).

SAMPLE LESSON PLAN

Science Concept: Behavior Management
Task: Establish a Positive Learning Environment

Objective: The student will be able to:

1. List the factors which help to create a positive learning atmosphere in the child care center
2. Evaluate personal qualities that have the potential to affect the learning atmosphere in the preschool

Teaching Aids:

Chalkboard
Chalk

I. Preparation of the Learner:

What factors seem to make you want to learn?

II. Presentation:

CONCEPT	CLASSROOM ACTIVITIES
Utilization of space	Discuss effective use of space in the preschool - Play Areas - Light - Temperature
Materials	Divide class into groups. Assign each group to a play area. List materials in the area and be ready to report to other groups how each contributes to the development of the child.
Teacher interaction	Brainstorm teacher qualities that encourage a positive learning environment. List on the chalkboard.

III. Application:

Have students individually complete Skill Builders on Student Assignment sheet.

ASSIGNMENT SHEET

Science Concept: Behavior Management

Task: Establish a Positive Learning Environment

Why Learn This?

The mood, tempo, or climate of a child care center is determined by many factors, some of which can be controlled by the child care aide. If you learn to be sensitive to these factors, you can use them to help manage the program and make it possible for the to derive the most from their experiences.

Principle Emphasized:

A positive learning environment results in social, emotional, and physical growth of the preschooler.

Words to Know:

Compensate
Counteract
Exposure
Overstimulation
Self-Fulfilling Prophecy
Strenuous
Subdue

Resources: Information Sheet - Establishing a Positive Learning Environment

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1. Read the resources
2. Complete Skill Builder - Words to Know
3. Complete Skill Builder - Personal Qualities Rating Sheet

INFORMATION SHEET

ESTABLISHING A POSITIVE LEARNING ENVIRONMENT

The conclusion of a recent study is that there are three major factors that influence the quality of preschool programs: 1) effective utilization of space, 2) materials that are stored within the children's reach, and 3) the amount and type of adult-child interaction.

Effective Use of Space: Adequate space should be provided for play. Play areas should be arranged so that children who are involved in active play do not interfere with those playing quietly. Children become loud and argumentative when they are crowded or their activities are constantly interrupted. Areas should be set up with consideration to the noise involved in each activity. The noisier block area should not be next to the quieter library space.

The normal daily routine should remain constant even though there are some physical changes in the room. The daily sequence of events should be planned to provide restful activities following periods of strenuous play, and mentally stimulating activities following less demanding ones. Children will become physically and mentally exhausted if they do not have a change of pace. Size of group and time of day also influence the mood of the group. The younger the children, the smaller should be the group. The more tired the children, the smaller the group. Plan activities which help to compensate for conditions you cannot change. Let a tired child play alone with a book or a game rather than including that child in an active game.

Children need to have beauty in their lives. The child care center should be painted a pleasing color that gives the room a light, airy feeling. The number and placement of windows as well as exposure and general climate should be considered in selecting a color. A small room with few windows facing north in an area where many days are cloudy will need to be painted a bright, cheery color to make up for the lack of outside light.

Artificial light is also important. There should be ample light at all times, and the lights should be regulated according to the activity. More light will be necessary in the art center than in the music center. As the activities change or move from one area to another, the lighting should be changed. Subdued lighting will usually be reflected in more subdued and quieter behavior from the children.

It should be possible to control room temperature. Rooms that are too warm or too cold will cause children to be listless, irritable, and uncomfortable. Active play areas can be cooler than quiet areas. The child care aide should observe children for signs of discomfort. Activities can be planned and used to help regulate temperature. If children are cold, try some warm-up exercises. If they are overheated, try a story or quiet music activity. Carpeting and draperies can help control temperature as well as noise.

Seasonal influences will also affect the mood of the center. Before holidays the children will be more excitable and tired. Activities should be planned to balance these conditions. Preschoolers who are already excited about a

Halloween party will enjoy it more if the party activities fit into the normal daily routine. Overstimulation usually results in tearful, upset children. Quiet activities relating to any holiday will enhance the holiday and increase the child's enjoyment without adding to any of the less happy side effects of overexcitement.

Storage of Materials: Materials should be stored on low, open shelves so that children can select what they want without being dependent upon an adult to get them. Storage space should be uncluttered with the items visible. Low dividers can be used for storage as well as to establish boundaries of space. A teacher will be able to see over the low divider and provide supervision; the children will be able to reach their own supplies, but still have privacy.

If possible, it is nice to change the room arrangement several times during the year. This adds variety and stimulation. Toys should also be rotated occasionally. Some should be put in storage while others are brought out. Children will enjoy these changes if they are not too frequent.

Adult-Child Interaction: The attitude of the director, teachers, and aides plays a major part in creating a wholesome mood in the center. Children see and imitate adult behavior. They are affected by the way caregivers get along with one another.

Children respond to the positive influences of cooperative teacher planning and the cheerful help and smiling support they see between teachers. When things are not right between staff members, children reflect the mood. Gossip and negative comments can cause both adults and children to become defensive.

Teachers and aides need to set an example of supportive behavior toward each other as well as toward the children. Not only are the words important, but the tone of voice carries an impact and conveys a message. Teachers who cooperate and are concerned about each other are willing to do their share. They are prepared for the day's activities because others are depending on them. They arrive at work on time and stay on the job through the entire day so that co-workers do not have to take over extra responsibilities for them. Consideration on the job creates a pleasant atmosphere which is transmitted to the preschoolers, and which encourages them to copy their adult models.

SKILL BUILDER

WORDS TO KNOW

Directions:

Using the following words, fill in the correct answer to the questions below.

Compensate
Counteract
Exposure
Overstimulation
Self-fulfilling Prophecy
Strenuous
Subdued

1. Which two words mean the same thing?

   ______________________________ and ______________________________

2. Which word means "using much energy"? ______________________________

3. The direction a window faces is known as the ______________________________.

4. Overstimulation is the opposite of ______________________________.

5. Believing that you will do something and then doing it is a __________ ____.

SKILL BUILDER

PERSONAL QUALITIES RATING SHEET

Directions:

Mark each quality according to the way you feel about its importance. Then rate yourself on each quality by placing #1, #2, or #3 in the column at the far right.

*RATING KEY
1 = Above Average 2 = Average 3 = Below Average

QUALITY	CHECK ONE			RATING KEY
	VERY IMPORTANT	IMPORTANT	NOT IMPORTANT	HOW I RATE
1. Being prompt				
2. Being prepared				
3. Showing affection to children				
4. Willing to help co-workers				
5. Creating a good feeling among co-workers				
6. Using techniques of positive reinforcement				
Setting an example for children by:				
7. Using good grammar				
8. Eliminating slang				
9. Cooperating with co-workers				
10. Following directions				
11. Using a pleasant voice				
12. Being helpful				
13. Controlling temper				
14. Obeying class rules				
15. Being honest				
16. Practicing personal cleanliness				
17. Trying to understand your co-workers and see their points of view				
18. Admitting blame when wrong				
19. Keeping work area neat				
20. Picking up after self				

a bird's eye view

POSITIVE REINFORCEMENT
IN THE PRESCHOOL

Understand this behavioral science concept:

People usually behave in ways that bring them satisfaction, recognition, and reward.

Teacher Materials
Information Sheet
Sample Lesson Plan

Student Materials

Assignment Sheet:	Develop Skills in Positive Reinforcement
Information Sheet:	Positive Reinforcement in Preschool
Skill Builders:	Words to Know Positives and Negatives in Guidance How Many Ways Can You Say, "Good for You"? Solve the Situation Positive Guides in Direction - Observation of Behavior

TEACHER INFORMATION SHEET

POSITIVE REINFORCEMENT IN PRESCHOOL

Understand this behavioral science concept:

People usually behave in ways that bring them satisfaction, recognition, and reward.

The aim of behavior modification is to achieve measurable changes in observable behavior. This consists of arranging or planning an environment in which the individual will come to produce what is identified as "desirable behavior." and not continue to produce "undesirable behavior."

The response of an individual in a given circumstance depends on the consequences of his/her behavior.

> Positive reinforcers are those events which, occurring after a response, increase the probability of the response.
>
> Negative reinforcers are those consequences which diminish the probability of the response.

Most young children who come to preschool are quick to sense an atmosphere of caring and consideration when it exists between teacher and children. In most cases, they return the good will. Social approval from a warm friendly adult is an important commodity to the young child. Most are willing to modify their behavior in response to adult approval. The young child's sensitivity to positive feedback from adults is clearly the most powerful single tool a teacher has for classroom management. Even a child who stubbornly ignores teacher disapproval shows behavior change in response to persistent teacher approval.

In any group there will be a few children who are insensitive to mild disapproval from adults. The teacher may decide to ignore the misbehavior of these children as much as possible, while still giving them regular doses of praise and approval for good behavior when it occurs. Misbehavior that cannot be ignored, should be handled promptly and consistently. The consequences for these behaviors should be made clear to the child, and they should be imposed consistenly from one time to another and from one adult to another. Always the heaviest burden for behavior change should be invested in the use of positive feedback for good behavior when it occurs.

Persky, Barry & Golubchick, Leonard. Early Childhood Education.
Avery Publishing Group, Inc., 1977.

SAMPLE LESSON PLAN

Science Concept: Behavior Management
Task: Develop Skills in Positive Reinforcement

Objective: The student will be able to:

1. Use a wide variety of positive words in making verbal praise
2. Use verbal praise as a form of positive guidance

Teaching Aids:

Game Cards
Beans
Three Signs
Paper Clips

I. Preparation of the Learner:

SUPER GAME: Have students suggest 30 or more positive terms used to praise others verbally; list them on the chalkboard. Give each student a blank SUPER GAME form. Have each place chosen words in various squares on the form. Make a master set of the words on separate slips of paper to be used in calling out the words. Proceed to play a form of Bingo with the students. Each covers the words on their game form as they are called out. Remember to have bits of paper or beans distributed to use as covers. You may wish to eliminate the most frequently overused terms of praise such as "good," "nice," and "okay," since the purpose of the game is to expand the vocabulary of praise-giving words.

II. Presentation:

CONCEPT	CLASSROOM ACTIVITIES
Positive reinforcement words and gestures	CAR WASH: The purpose of this activity is to raise an individual's self-esteem through positive reinforcement. Divide the class into two lines. Each line should stand facing the other about 4 feet apart. A person may be selected or volunteer to be the "car." The "car" advances between the two lines as each person touches "it" and says something good or gives a compliment. The old "car" takes a place at the end of one line and a new "car" is chosen. This works especially well if you have a target student who has a self-image problem be the "car" after the third or fourth round. This may be repeated periodically when someone or the class needs a boost.

II. Presentation:

CONCEPT	CLASSROOM ACTIVITIES
Praise or criticism	IALAC: The purpose of this activity is to show the effects of praise and crit visually. Make three signs, each 9" x 12," with the letters I A L A C printed on each. Select three students to hold the three signs. Point out that everyone carries signs of their self-esteem almost as obvious as these. The letters stand for I AM LOVABLE AND CAPABLE. Then proceed to compliment one student giving him or her a portion of an extra sheet to hold showing that praise has added to their self-esteem. Tell the next student that he or she cannot do several things right or well. Say it in a negative form and tear bits of paper off this person's sign with each comment. The third student should be severely reprimanded and the whole sign torn up and thrown on the floor. NOTE: Discuss the effect on the feelings of the students and the audience as they watched. Be sure to praise and reward the participants who held the signs.
Positive or negative guidance	GETTING CLIPPED: Early in the day, issue each student 10 paper clips. They may be chained together for convenience. When a student recognizes that another has used a negative form of guidance, he or she may demand one of their paper clips. That clip is added to the recognizer's chain. The point is to keep and lengthen one's own chain throughout the day. The student having the longest chain at the end of the day should receive an award decided in advance.

III. Application:

Have the students complete the Skill Builders on the Student Assignment Sheet individually or in groups.

S U P E R G A M E

S	U	P	E	R
		☒		

S	U	P	E	R
		☒		

ASSIGNMENT SHEET

Science Concept: Behavior Management

Task: Develop Skills In Positive Reinforcement

Why Build Skills in Positive Reinforcement?

Knowing how to help others feel good about themselves can be learned. WHY you should learn how to do this and practice these habits in your work with children and others should be easy to answer. Why do you like to feel good about yourself? Why do you like to feel that you're a success? What do other people do to you that makes you feel like trying hard to do something well and makes it possible to take the risk of failing? If these habits don't come naturally to you now, they can if you will practice. The rewards are as great for others as they are for you. The information in this lesson will suggest techniques you can use as you make these skills a part of yourself.

Principle Emphasized:

People usually behave in ways that bring them satisfaction, recognition, and reward.

Words to Know:

Absolute Directive
Body Language
Consistency
Behavior
Gestures
Negative
Non-Verbal
Priority
Praise
Positive
Reward
Reinforcement
Stimulus
Verbal

Resources: Information Sheet - Positive Reinforcement in Preschool

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1. Read the resources.
2. Complete Skill Builder - Words to Know
3. Complete Skill Builder - Positives and Negatives in Guidance
4. Complete Skill Builder - How Many Ways Can You Say, "Good for You"?
5. Complete Skill Builder - Solve the Situation
6. Complete Skill Builder - Positive Guides in Direction - Observation of Behavior

INFORMATION SHEET

POSITIVE REINFORCEMENT IN PRESCHOOL

Types of Positive Reinforcement

1. Verbal Reinforcement. People usually behave in ways that bring them satisfaction, rewards and recognition. As a result, a person may be motivated to behave in certain ways because of the pleasure enjoyed. A gesture of affection, encouragement or praise after a certain act will stimulate the person doing it to act in the same way again. This method of learning to repeat an action that has been satisfying is called positive reinforcement. A most effective device for motivating someone to repeat behavior is a sincere compliment. We commonly call this type of compliment praise. Another term which has the same meaning is verbal reinforcement.

2. Non-Verbal Reinforcement. Touches of affection such as pats, hugs, and taking of the hand, and gestures of recognition or welcome such as a nod of the head, smile, wave, wink, or thumbs-up are another classification of reinforcers. Two terms for silent approval are body language and non-verbal reinforcement.

3. Material Reward. A third form of positive reinforcement is material reward like tokens, prizes, and food. Behavior is repeated in order to receive things that are desired. A reward may be one that is received and enjoyed right away. It may also be one which is saved and added to others in order to be traded in for something special at a later time. Something becomes a reward only if it is really wanted by the one who is to receive it.

Negative Reinforcement

On the opposite end from positive reinforcers are negative reinforcers. Negative reinforcement and negative reinforcers call attention to what is being done wrong or what should not be done. Negative reinforcement can be verbal or non-verbal. Such statements or directions as "no," "not," "won't," "can't," "don't," and "doesn't" are verbal examples. Frowns and slaps are non-verbal. Words which give no choice such as "never," "stop," "quit," and "always" are known as absolute directives.

Techniques of Positive Reinforcement

The following techniques and ideas are keys to using positive reinforcement in your relationships with children, with your friends and family, and with co-workers.

1. In giving directions or stopping an undesirable activity, TELL WHAT CAN BE DONE, rather than what cannot be done.

2. When your directions are being followed, GIVE PRAISE FOR THE REQUESTED BEHAVIOR.

3. When there are limits that have to be set, STATE LIMITS CLEARLY AND MAINTAIN THEM CONSISTENTLY.

4. When a child requests help, GIVE ONLY THE HELP NEEDED RATHER THAN ALL THE HELP WANTED. Support efforts with praise and encouraging gestures, but don't step in and do the job. A child may need to struggle to accomplish a task.

5. In giving compliments, PRAISE SHOULD BE SINCERE AND HONESTLY EARNED. Too much may be as poor as none.

6. To be most successful, REWARDS MUST BE IMMEDIATE, particularly with children since their memories are short.

7. When they must be used, NEGATIVE STATEMENTS SHOULD BE SAVED FOR THE MOST SERIOUS OFFENSES WHERE SAFETY IS A FACTOR.

SKILL BUILDER

WORDS TO KNOW

Directions:

Define the following vocabulary words.

Absolute Directives: ____________________

Body Language: ____________________

Consistency: ____________________

Behavior: ____________________

Gestures: ____________________

Negative: ____________________

Non-Verbal: ____________________

Priority: ____________________

Precise: ____________________

Positive: ____________________

Reward: ____________________

Reinforcement: ____________________

Stimulus: ____________________

Verbal: ____________________

SKILL BUILDER

POSITIVES AND NEGATIVES IN GUIDANCE

Directions:

Mark the following - P if positive guidance
N if negative guidance
B if body language

Circle the negative words in the statements you mark with an "N." Restate the sentence in a positive guidance form.

_____ 1. "Sit behind this tape." (pointing to it)

_____ 2. "Don't let him catch you."

_____ 3. "We'd better not play with that now. It's time for game."

_____ 4. "Let's not pretend with that." (taking away the tinker toy)

_____ 5. "Jason, we don't run in the nursery."

_____ 6. "Jenny, it's your turn to hand out cookies."

_____ 7. "Please don't do that boys, you'll get hurt."

_____ 8. "Give this to Miss Kim." (handing a puzzle piece)

_____ 9. "Wait a minute, Mike, until I can help you."

_____ 10. Sigh and a head shake up and down.

_____ 11. "Don't crowd at the telephone; you'll get a turn."

_____ 12. "You can sing,but don't shout out the words."

_____ 13. "Show me how you did it."

_____ 14. Taking his hand, "Dustin, let's go to the restroom."

_____ 15. "Don't fall now. You're getting too rough."

SKILL BUILDER

HOW MANY WAYS CAN YOU SAY, "GOOD FOR YOU"?

Everyone knows a little praise goes a long way. That little praise needs to be tailored to the situation instead of being worn out and used over and over, it it is going to be effective. It should be honest, not too flowery or exaggerated. Too much praise is as bad as too little.

"Good," "very good," and "fine," are most used and need to be garnished. "Say, that's really great!" "Thank you very much." "Everyone's working so well." "Surely looks like you had fun doing that." "Beautiful!" "Keep up the good work." "Marvelous!" "Groovy!" "Right on!" "That's a good job, why don't you show Miss ______________?" "Wow, that's great!" "Much better." "How clever." "You are really sharp to think of that." "Thank you Joey for raising your hand." "John is staying inside of the lines of his drawing." "Mary is doing her picture in many colors." "You are a considerate group to wait so long." "Melanie is waiting patiently for her turn in the game." "Now you have the idea."

Directions:

There are many, many more phrases you may say to give praise. Avoid the easiest filler talk of "okay." All of us have to overcome this habit. Fill in the rest of the sheet with phrases you may be able to use that are different from those listed.

1.

2.

3.

4.

5.

6.

7.

8.

9.

10.

"How impressive!"

SKILL BUILDER

SOLVE THE SITUATION

Directions:

Respond to each situation with a different positive reinforcement technique.

a. Only one response may be verbal.

b. Three responses must be non-verbal or a combination of both verbal and non-verbal.

1. Situation A: Johnny has been trying very hard to throw beanbags through a hoop but he has not been successful.

   Response:

2. Situation B: Mary just poured sand on Jane's head and Jane is crying.

   Response:

3. Situation C: Billy is sitting alone playing with the blocks, he looks up at you.

   Response:

4. Situation D: You are reading to several children and one of them moves in front of another in order to see the pictures more closely.

   Response:

Swell! Let's share your ideas.

SKILL BUILDER

POSITIVE GUIDES IN DIRECTION-OBSERVATION OF BEHAVIOR

Directions:

Observe and record at least 8 situations in which directions are given by the assistant teachers in the preschool. Analyze them for techniques of positive and negative guidance.

Assistant Teacher	Child (name) or Group	1) Record exact words and motions of directions given. 2) If the direction is negative, re-state below in positive way.	Was it: P - Positive N - Negative B-Body Language	Did it work? Why? Why not?

a bird's eye view

SAFETY IN THE PRESCHOOL

Understand this behavioral science concept:

Habits of safety can be improved through awareness and reinforcement.

Teacher Materials
Information Sheet
Sample Lesson Plan

Student Materials
Assignment Sheet: Maintain a Safe Environment in the Preschool
Information Sheet: Maintaining a Safe Environment for Children
Skill Builders: Words to Know
Teaching Preschoolers Safety Practices

TEACHER INFORMATION SHEET

Understand this behavioral science concept:

Habits of safety can be improved through awareness and reinforcement.

DEVELOP HABITS OF PERSONAL SAFETY

Clothing and Safety: Wear clothing that fits well and is comfortable. Tight-fitting clothing restricts movement and loose clothes may catch on things causing accidents or injury. A loose-fitting top can catch fire at the stove. Clothing should not be a distraction. You should not have to pay attention to your clothes during the working day.

Be sure clothing is washable and that you keep it clean. Protect your clothing by wearing a smock that has large pockets for carrying tissues and other small items.

Shoes and Safety: Shoes should fit well, give adequate support, and be low-heeled to enable you to move quickly and safely. Closed-toe shoes protect you when children step on your toes or drop toys. Never wear high-heeled shoes, clogs, or go barefoot in the child care center.

Hair and Safety: Hair should be clean and well groomed. Long hair should be tied back to prevent it from catching in things. Hair should not obstruct vision; it should be away from the eyes.

Jewelry and Safety: If jewelry is worn, keep it simple. Avoid dangling earrings or necklaces, large rings, or bracelets. Jewelry can catch on things such as a hot pan on the stove or can bruise or scratch a child accidentally.

Lifting and Safety: Avoid lifting children who are able to walk. Lifting requires energy that can be used in better ways. It also can cause back injuries and pain. If it is necessary to lift children or move heavy pieces of equipment, be sure to use the long muscles of your legs rather than the weaker muscles of your back by bending from the knees rather than from the waist.

Electricity and Safety: Plug electrical equipment in before turning it on. Turn the item off before unplugging it. This avoids being surprised or hurt by a piece of machinery or an appliance that unexpectedly operates the moment it is plugged in. Be sure that your hands are dry before plugging in or handling an electrical appliance or piece of equipment. Make sure that cords and plugs are safe for use with no exposed wires or frayed cords.

Kitchen and Safety: Keep knives and sharp utensils at the back of the kitchen counter out of the reach of children. Keep pan handles turned toward the side or back of the stove, never pointing outward where they can be bumped or pulled over.

Paper Cutter and Safety: Be sure the fingers are well back from the cutting blade of the paper cutter. After using the cutter, put the handle with the cutting blade down and fasten it securely in a closed position.

SAMPLE LESSON PLAN

Science Concept: Safety
Task: Maintain a Safe Environment in the Preschool

Objective: The student will be able to:

1. List safety considerations required in caring for children.
2. Examine and evaluate personal habits and standards of safety.
3. Build new habits of safety as a qualified child care worker.

Teaching Aids:

Student Information Sheet

I. Preparation of the Learner:

Establishing habits of personal safety will help you complete your job more easily and with less risk to yourself. In addition, your value as an employee will be increased as you show consideration for your well-being and the well-being of others, and as you model habits of safety for the children to imitate.

II. Presentation:

CONCEPT	CLASSROOM ACTIVITIES
Safety for preschool workers	Develop a safety checklist to be used to evaluate child care workers. (Use Teacher Information Sheet)
Safety for preschool children	Read: "Maintaining a Safe Environment for Children" Discuss: Hazards in the Preschool Have the students individually review the child care center for safety hazards. List the hazards identified on the chalkboard during class discussion. 1. Have each student select a different unsafe condition and suggest how to make the area or condition safer. 2. Outline rules that teach the children how to minimize the danger.

III. Application:

Have students individually complete the Skill Builders on Student Assignment Sheet.

OR

Teaching Preschoolers Safety Practices can be completed and taught to the entire class. Class discussion should follow each presentation to evaluate the safety lesson taught.

ASSIGNMENT SHEET

Science Concept: Safety

Task: Maintaining a Safe Environment in the Preschool

Why Learn This?

In the United States, more children are crippled by accidents than by disease. More children die from accidents than from a combination of cancer, congenital malformations, and pneumonia. The occurrence of accidents is influenced by environment, emotional conditions, physical health, and ignorance. Children are naturally curious, and they do not always recognize danger. It is the responsibility of those who work in the child care center to provide a hazard-free environment and patient instruction in safety to ensure the protection of the children in their care.

Principle Emphasized:

Habits of safety can be improved through awareness and reinforcement.

Words to Know:

Preoccupied
Prevention
Hazards
Restricted
Flame Retardant
Nontoxic

Resources: Information Sheet - Maintaining a Safe Environment for Children

---

1. Read the resources.
2. Complete Skill Builder - Words to Know
3. Complete Skill Builder - Teaching Preschoolers Safety Practices

INFORMATION SHEET

MAINTAINING A SAFE

ENVIRONMENT FOR CHILDREN

A research team from Children's Hospital in Boston reports that accidents are more likely to happen when:

1. Caretakers do not know what to expect from children at a certain stage of development.
2. Caretakers are not familiar with the normal routines of children.
3. A child is tired, hungry, angry, or confused.
4. Hazards are present such as sharp knives, medicine bottles, busy streets.
5. Hazards are attractive - food cooking on the stove, open flames, swimming pools.
6. The child's environment has changed, as on vacation or when entering preschool.
7. Caretakers do not know safety procedures.
8. Consistent routines are not established, and the child does not know what is expected.
9. There are problems in the child's family such as illness, financial or marital stress.
10. Space and equipment are not arranged safely or maintained.
11. The caretaker is unhappy, ill, or preoccupied instead of alert to the needs of the child.
12. Conflicts exist between the caretakers.

If you examine the list closely, you will notice that in each of the twelve instances, an adult could prevent an accident by removing the condition that leads to it. Prevention is the responsibility of each adult working with a child. Where children's safety is concerned, do not depend on anyone else to take care of the problem.

* You are responsible for knowing what each child is capable of doing and for providing help if necessary.

* You must know and follow the plans for daily routine.

- * _You_ should make sure all equipment and play areas are safe for the children to use.

- * _You_ must remove all hazards that can be eliminated, and protect the child from hazards that you cannot remove.

- * _You_ must provide adequate food and rest for the child and give guidance in helping the child handle strong emotions.

- * _You_ must be constantly alert.

    1. Sit or stand where you can see everything
    2. Position yourself close to problem areas
    3. Avoid gathering with adults into groups - spread the supervision over the entire center
    4. Pay attention to the children, not to another co-worker
    5. Keep hands out of pockets to be ready to use them at once

A safe environment does not mean a restricted one. Children need to explore and experiment in order to satisfy their normal curiosity, but they must have limits for safety. A child may run and play in the yard or playground, but the streets should be off limits. Be sure the child knows why some experiences are not safe. Information which seems obvious to adults is often new and unclear to children. They may need the "why" explained several times since their memories are short and new habits take time to form.

Toys must be sturdy, free of sharp edges, and with solid parts that cannot be broken off and put into mouths, ears,or noses. They should be painted with nontoxic paint, and made from flame retardant materials.

Medicines, cleaning compounds, and insecticides should be stored out of sight and out of reach of the children. Put these materials away directly after using them even though it may be convenient to do it a little later. If children are taught to ask permission before eating or drinking anything, the child has another bit of prevention working for his or her safety. Children should not be allowed to play on grass or other areas where weed killers or fertilizers have just been used. These materials can cause severe skin irritation and burns as well as respiratory problems.

Teach children the safe way to get in and out of cars. The child care aide should help to establish habits of sitting in the car and waiting for permission to get out. Children may also need help in learning not to take rides with strangers.

Help children learn safe walking habits. When children are taken for walks or field trips, be sure there are enough adults to provide adequate supervision. Tell the children ahead of time where they are going and what is expected of them. Demonstrate how you expect them to walk and act in the group, and model the behavior you want from them.

A safe, well supervised environment is essential for protecting eyesight. Keep sharp objects away from the children and be sure toys are free from projections. Guns, darts, and similar toys do not belong in the child care center. Teach the children to throw only objects meant to be thrown and to do their throwing in an area in the playground. Eyes should be protected from the sun. A shady area in the playground, a sun hat or a visor, if no shade is available, will help. Help students keep their hands reasonably clean as since rubbing the eyes with dirty hands can cause eye irritation and infection. Play areas should be well lighted to prevent eye strain and accidents. Teach children to turn on the lights rather than stumble around in a dark area and risk falling.

Establish and enforce playground safety rules. Set up a quiet play area and more active areas for bicycles, balls, and large muscle games.

Children need to be taught how to handle pets safely. They should learn to respect the animal and not approach it when it is eating, growling, or showing other signs of restlessness. Children can benefit by helping to care for pets, but they must know that they are not to approach any animal without an adult.

General lab safety lessons for children include:

1. The proper way to carry a chair, scissors, or other sharp tools
2. Use of safety goggles at the workbench
3. Why and how to put away toys and not leave them on steps, in hallways, or where the toy may cause someone to stumble
4. Using toys properly such as throwing balls, not trucks
5. Never playing with matches or fire
6. Not hiding in old boxes, trunks, and refrigerators
7. Climbing on things meant for climbing, rather than standing on chairs or tables
8. Staying in the lab until a teacher or parent takes the child out
9. Holding an adult's hand when crossing a street or walking in a parking lot

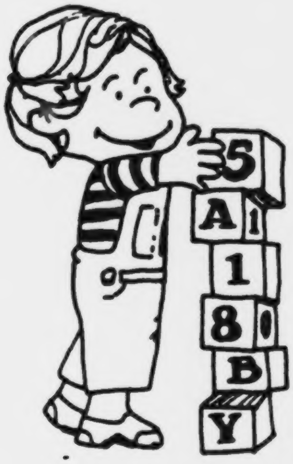
The joy of a safe and healthy childhood is in the
caregiver's hands -- your hands!

SKILL BUILDER

WORDS TO KNOW

Directions:

Use the dictionary to find the correct meaning for the vocabulary words as they are used on the information sheet.



1. Preoccupied

2. Prevention

3. Hazards

4. Restricted

5. Flame Retardant

6. Nontoxic

SKILL BUILDER

TEACHING PRESCHOOLERS
SAFETY PRACTICES

Safety Poster:

Develop a safety poster which illustrates a safety precaution. Use it to teach a new idea or to reinforce one that has already been taught to the children.

Plan and present a safety lesson for a group of children using the poster.

Lesson Plan:

See the SAMPLE SAFETY LESSON below.

SAMPLE SAFETY LESSON

LESSON: Is It Safe?

OBJECTIVE: Preschoolers will be able to identify safe and unsafe situations they see in pictures.

EQUIPMENT: Pictures from magazines and/or free-hand drawings showing potential safety hazards.

PROCEDURE: Hold up a picture and say--

"Here is a picture of a cat eating from its dish. See the child? What do you think the child is going to do?"

"If the child tries to pick the cat up when it is eating, will it be angry?"

"What do cats do when they are angry?"

"Do you think the cat will hurt the child?"

"Is it safe to touch an animal when it is eating?"

"Are there other times when it isn't safe to touch an animal?"

"When is it all right to touch animals?"

Continue activity with two or three more situational pictures.

a bird's eye view

TRANSITION IN THE PRESCHOOL

Understand this behavioral science concept:

How a child is moved from one activity to another directly influences his or her behavior.

Teacher Materials
Information Sheet
Sample Lesson Plan

Student Materials
Assignment Sheet: Help Children Make Transition Between Activities
Information Sheets: Transitions that Teach
Clean-up Following Free Play
Skill Builders: Words to Know
Traffic Patterns
Giving Directions for Transitional Activities

TEACHER INFORMATION SHEET

Understand this behavioral science concept:

How a child is moved from one activity to another directly influences his or her behavior.

HANDLING TRANSITION IN THE PRESCHOOL

There are many reasons why a transition from one activity to the next may be difficult for children:

1. The child who is enjoying the current activity is often not ready to change to another one.
2. The child who feels a need to show independence may be unwilling to change to another activity.
3. The clean-up and put-away activities of the preschool may be connected with punishment or have other negative meanings to the child.

In making a smooth transition from one activity to another, you must consider the children and their needs. They should have advance warning before being asked to stop an activity. Children find it easier to conform if they know what to expect. "It is almost time to clean up and get ready for a story," is better than, "Clean up now."

Children need models to copy. If you expect them to put away toys, you must show them how and help them to do it. If the child care aides stand around giving directions instead of helping, the children will usually not do as they are told.

Transitions should be fun. Smile, be enthusiastic, and act like you are anxious to move on to the next activity. A clean-up transition should be part of an activity, not a punishment. When you say, "If you don't stop that you'll have to clean up and sit at the table," you tell the child that it is bad to clean up and sit at the table. When you say, "After we clean up we'll be able to go over to the table," the children will be anxious to help and go on to the next activity.

Some transitions are difficult because of physical restrictions in the child care center itself. Some of these include:

1. Awkward traffic patterns
2. Crowded areas

With the help of your teacher, you may be able to determine whether your center has these problems and to make adjustments that will improve the success of transitions.

The transitional activity should not become a race or be competitive. Encourage children to follow directions and be proud of their ability to help with requested tasks regardless of the time involved. Children need time to complete the transitional activities at their own speed. Some will put on their jackets quickly and get in line for outdoor play. Others will lag behind and struggle with buttons, sleeves, and mittens. You will need to accommodate these individual differences by planning quiet activities which the children may join as they complete the transition.

SAMPLE LESSON PLAN

Science Concept: Behavior Management
Task: Help Children Make Transition Between Activities

Objective: The student will be able to:

1. Determine the meaning of words related to transition activities from context clues
2. Identify patterns of traffic in the preschool laboratory
3. Direct transition using the children's activities as the basis for giving directions.

Teaching Aids:

Chalkboard
Chalk
Student Information Sheet

I. Preparation of the Learner:

What does transition mean? When does transition happen in the preschool? It is important to plan transition activities that keep the preschool schedule flowing smoothly and that help children choose desirable behavior.

II. Presentation:

CONCEPT	CLASSROOM ACTIVITIES
Need for transition activities	Lecture: Use Teacher Information Sheet
Ways to handle transition	Read and Discuss: "Clean-up Following Free Play"
Transition activities	In each of the following situations, tell what might be said to bring the children to the storytelling corner to join a quiet group. 1. Several children in the dollhouse area are dramatizing. They are playing that one boy is a visitor in the house. 2. Three girls have lined up chairs and are taking a bus ride to some vacation site. 3. Two children are standing by the aquarium watching the fish. One boy begins moving his mouth to imitate the

II. Presentation: (Cont'd)

eating motions of a fish. He moves back and forth finning his arms.

4. Two boys are conducting a make-believe experiment in a laboratory set up at the sink counter.
5. The nursery children have just dramatized a space trip to the moon and have moved to the music on a record while taking a moon walk.
6. Some girls with hats on their heads are being silly clowns. They are dancing around the room and giggling.
7. One corner of the nursery is a deep, dark jungle where some children are natives and some are wild animals.

III. Application:

Have students complete Skill Builders on Student Assignment Sheet individually or in groups.

ASSIGNMENT SHEET

Science Concept: Behavior Management

Task: Help Children Make Transition Between Activities

Why Learn About Transition?

The times when children change from one activity to another may be noisy, disorganized, and frustrating for children and teachers if the process is not planned ahead. With help from your studies and ingenuity on your part, you will be able to direct children to new activities in a smooth and interesting way.

Principle Emphasized:

How a child is moved from one activity to another directly influences his or her behavior.

Words to Know:

Conform
Ingenuity
Restriction
Procedure
Sequence
Transition

Resources: Information Sheet - Transitions that Teach Clean-up Following Free Play

---

1. Read the resources.
2. Complete Skill Builder - Words to Know
3. Complete Skill Builder - Traffic Patterns
4. Complete Skill Builder - Giving Directions for Transitional Activities

INFORMATION SHEET

TRANSITIONS THAT TEACH[1]

Ways to Handle Transitions

... structure experiences to provide learning opportunities during transitional periods.

... give directions for moving from one activity or area to another.

Getting into line-up time can be an experience which is socially and intellectually stimulating. Children can have fun with one another. They can also be led into thinking and experimenting. Here are some new ways of making the transition into line-up time -- try some.

Maybe you have heard a teacher say, "All the people in row one may get their coats." Or, "All the girls may get in line." The directions called attention to seating arrangement or to sex differences. Directions used at these times will determine the focus of the children's attention.

Look at the children and decide some ways of distinguishing them. Be sure that every child will fall into at least one distinguishing category.

"... all the people with tie shoes"

"... all the people with buckle shoes"

"... all the people with clip-on shoes"

or maybe

"black shoes"
"brown shoes"
"red shoes"

or

"curly hair"
"straignt hair"

or

"one tooth missing"
"two teeth missing"
"no teeth missing"
"who painted at the easel this morning"
"who played with the puzzles this morning"

or

"brown eyes"
"blue eyes"
"hazel eyes"

or

"whose first or last name begins with J (or like Jane's)"

or

"blonde hair"
"brown hair"

or

"something red on"
"something green on"

or

"something that's stripped"
"something that has dots"
"something that is plaid"
"something that is solid"

or

"something that is brand new"
"something that used to belong to someone else"
"something that you've worn before"
"something with a certain kind of fastener..."
    "a hook and eye"
    "a zipper"
    "buttons"
    "no fasteners"

These are some ways of calling on small groups of children. But directions can also be more personal. For instance, something can be said to distinguish an individual child from all the others in the group. For example:

"someone who lives at 36 Park Lane"

or

"someone who has a baby brother named Robbie"

or

"someone whose grandmother is coming for a visit"

or

"someone whose initials are JAT"

Children can be directed to move in certain ways as they get into the line - hopping or skipping, tiptoeing or jumping are variations on walking.

Or a dramatic approach can be used:

"Be a floating autumn leaf."
"Be a drifting snowflake."
"Be a robot."
"... a butterfly."

"... a rag doll."
"... a quiet little mouse."
"... a Halloween ghost."

Make a game by combining an individual's creative movement with group observation and "guessing."

> "Walk like an animal and we will see if we can figure out what you are."

> "Be a machine and we will guess you."

Lining up can sometimes be correlated with the preceding or following activity. For example:

> "We have been talking about how plants grow. Now I'm going to let each of you be a little seed and I'm going to plant you in a row at the door. I'll plant you here, Marcy. You are very tiny and you are way under the warm soil. Now the gentle rain falls and the warm sun shines on you. Soon you'll start to grow. Here is where I'm planting Phillip..."

Children will imagine with us whenever we can let ourselves believe the activity and enter into it wholeheartedly.

Another idea - -

Be a balloon man with the children being the balloons. Draw each one silently across the room by an imaginary string.

Another idea - -

Play a happy instrumental record and let the children be m arionettes. You manipulate the wires which move the jointed dancers into line.

Methods of moving into line-up time can be varied in limitless ways. Think of some new ways to try.

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[1] Vocational Home Economics Resource Guide for Child Care Services, Ohio Department of Education, Division of Vocational Home Economics, (Columbus, OH 1977)

INFORMATION SHEET

CLEAN-UP FOLLOWING FREE PLAY

1. As free play time nears end, look around the room to study kinds of activities and movement.
2. Notice each individual's activity.
3. Determine each individual's involvement in the activity.
4. Study the children's activities. Discourage anyone who is about to take out equipment to begin a major, extended period project.
5. Determine which job or jobs will require the most clean-up time.
6. Quietly initiate clean-up in the area or areas which have been identified as time-consuming.
7. As the work progresses in the time-consuming area or areas, give the signal for class attention.
8. Announce clean-up time. Clearly direct children by stating exactly what is to be done as soon as clean-up is completed. For example: "Put your things away and check to see if everything is neat. Look around to see if you can help a friend. When you finish, please join me on the rug."
9. Walk around the room watching the children and offering help and suggestions as necessary. Encourage children to check and evaluate their clean-up work.
10. As most of the children finish, begin transitional activity (discussion, song, fingerplay, game, etc.).
11. Remain in a station from which it is possible to both direct the transitional activity and supervise those still completing clean-up tasks.
12. Assign an assistant to any child who has a problem requiring another child's aid.
13. Maintain the group activity with as few subject shifts as possible. Interrupt only when absolutely necessary and then give directions in concise, positive statements.
14. Continue activity as late joiners come into the group.

SKILL BUILDER

WORDS TO KNOW

Directions:

Find the correct meaning for each vocabulary word and fill in the word which best completes the following sentences in the blank spaces.

Conform
Ingenuity
Procedure
Sequence
Restriction
Transition

1. A time of change ______________________________.

2. The act of confining or holding within bounds ______________________.

3. To obey customs or standards ______________________.

4. The condition or fact of following something else ______________________.

5. Skill or cleverness in planning or inventing ______________________.

6. A particular way of doing something ______________________.

SKILL BUILDER

TRAFFIC PATTERNS

The purpose of this activity is to help you identify the usual traffic patterns in a child care center. It is to help you see problem areas in advance so you can change room arrangement or activity sequence to avoid them.

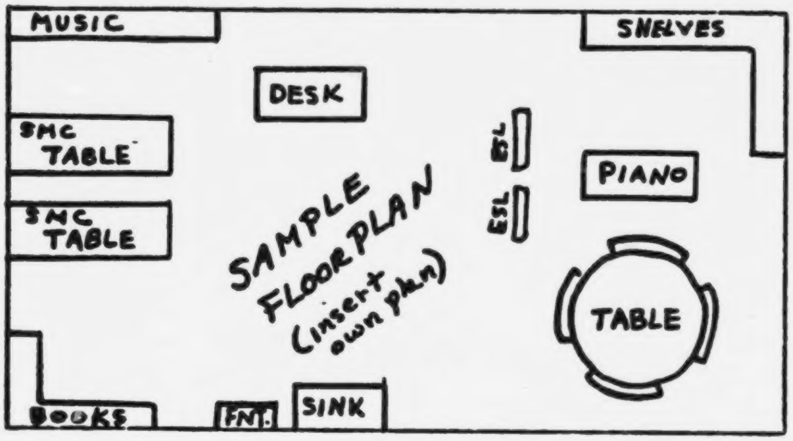
Directions:

Duplicate several floor plans of your laboratory area with the major activity centers marked. Using a pencil, chart the movement of preschoolers on the floor plan during the transition periods. Use a separate floor plan for each transition. Identify problem areas in room arrangement and discuss the possibility of change to eliminate obstructions.

Floorplan Symbols

⟶ = flow of traffic

0 = obstruction to traffic


MUSIC
SHELVES
DESK
SMC TABLE
SMC TABLE
ESL
ESL
PIANO
SAMPLE FLOOR PLAN (insert own plan)
TABLE
BOOKS
FNT.
SINK

1. List physical problems observed in smooth flow of traffic for transition.

2. List suggested changes in physical setting to improve transition.

SKILL BUILDER

GIVING DIRECTIONS FOR TRANSITIONAL ACTIVITIES

Directions:

Six situations are given below that can be used as springboards in a transitional activity to move children to another activity. Develop a transition for each situation showing how you would use it in helping children make the move. Write your transition below each situation.

1. Using physical characteristics of a child or children -

2. Using the alphabet -

3. Using the children's earlier activities of the day -

4. By identifying the child without using a name -

5. By acting out or pretending to be something else -

6. By using the child or children's location in the room -

a bird's eye view

USING PRINCIPLES OF PSYCHOLOGY IN GIVING PATIENT CARE

Understand this behavioral science concept:

Positive reinforcement has an influence on physical and emotional health

Teacher Materials
Information Sheet
Sample Lesson Plan

Student Materials
Assignment Sheet: Use Principles of Psychology in Giving Patient Care
Information Sheet: Positive Qualities for a Health Aide
Skill Builders: Words to Know
Working with Elderly People

TEACHER INFORMATION SHEET

Understand this behavioral science concept:

Positive reinforcement has an influence on physical and emotional health

TYPES OF VERBAL COMMUNICATION

People send messages to others. These messages can be positive or they can be negative. They have an influence on the receiver.

Positive responses seem to motivate and make people feel good about themselves. Warmth as a personality characteristic can also be a motivating factor.

Let's take a look at several types of verbal communication and the responses they elicit.

1. Ordering, Commanding, Directing - These messages tell a person that his or her feelings, needs,or problems are not important.
2. Warning, Threatening - These messages show little respect for the other person's wishes. They make the other person feel fearful and submissive. They usually evoke hostility.
3. Moralizing, Preaching - These messages show lack of trust in the other person's judgment. They cause feelings of guilt and lack of faith in the other person's ability to make judgments or hold values of his or her own.
4. Judging, Criticizing, Disagreeing, Blaming - These messages make the other person feel stupid, inadequate, inferior, and unworthy.
5. Name-Calling, Stereotyping, Ridiculing - These messages are forms of negative evaluation and have a devastating effect on one's self-image.
6. Interpreting, Analyzing, Diagnosing - These messages say, "I have you figured out." They are threatening and frustrating. They make a person feel exposed, naked, and embarrassed.
7. Reassuring, Sympathizing, Consoling, Supporting - These messages have a tendency to imply that the troubled person is exaggerating and doesn't understand how things really are.
8. Questioning, Probing, Interrogating, Cross-Examining - These messages may convey doubt, suspicion, or a lack of trust.

9. Withdrawing, Distracting, Being Sarcastic, Humoring, Diverting - These messages can communicate lack of interest, lack of respect for the other person's feelings, or rejection.

10. Acknowledged Response - These messages communicate attention, but only weakly.

11. Active Listening (Feedback) - These messages communicate a feeling of respect, understanding,and acceptance.

Thomas Gordon, T.E.T. Teacher Effectiveness Training, (New York, NY: Peter H. Wyden, 1974).

SAMPLE LESSON PLAN

Science Concept: Communication
Task: Use Principles of Psychology in Giving Patient Care

Objective: The student will be able to:

1. Identify words that communicate a positive message
2. Describe how to provide patient care that enhances patient recovery

---

Teaching Aids:

Transparency
Marker
Overhead Projector
Bed
Linens for changing the bed

I. Preparation of the Learner:

A health aide might be employed in a private home, a nursing home, a hospital, or a rehabilitation center. The aide must be aware that sick people, of any age, react emotionally to illness. The health aide giving patient care has a direct influence on the patient's recovery. How the aide reacts to situations will probably determine how much effort the patient will exert to get well. The more the health aide understands why the patient behaves as he/she does, the more successful the aide will be on the job.

II. Presentation:

CONCEPT	CLASSROOM ACTIVITIES
Communication and care work together to affect patient recovery	Role Play: 1. Have one student volunteer or select a student to be the patient. He/She gets into bed and role plays being a patient. 2. Select a student that will be able to successfully violate good concepts of communications. 3. Instruct the student acting as the health aide to: a. bang and slam into the room b. have a mean expression on his/her face c. neglect to speak d. proceed to change the bed e. halfway through the procedure, have the aide remark, "Boy, do you look sick today!!"

II. Presentation:

CONCEPT

CLASSROOM ACTIVITIES

4. Ask two other students to arrive at the room to visit the patient, and have the health aide treat them in a very crude manner.

5. While this role playing is being performed, the remaining members of the class can observe and jot down on paper everything that was done that violates good communication skills in caring for patients. Suggest the students form two columns. The second column will be used after the second phase of the lab activity is completed.

Second phase of the activity

The same set-up. The same roles but different students performing. Reverse situation by instructing the health aide to:

a. enter the room in a cheerful, quiet manner
b. smile
c. speak to the patient
d. explain what he/she is going to do
e. halfway through the procedure have health aide pause and compliment or have pleasant conversation with the patient
f. ask the visitors to arrive and have health aide be very congenial
g. the health aide completes changing the bed and leaves the room

Students in the class should be observing and writing in the second column all the correct things that are done that support good communication skills in caring for the patient. If students switch roles they should trade their observation papers so the first actors continue to be involved.

Words that Communicate Positively:

Prior to related class time, make up a transparency with words that communicate in a positive way. Ask students to work in groups of two and choose four words. Each group will discuss the individual words they have selected.

II. Presentation:

CONCEPT	CLASSROOM ACTIVITIES
	They should discuss how these words would apply to taking care of patients and the psychological affect these words would have on themselves as health aides and on the patients. Report to the rest of the class. The teacher will cross off words on the transparency until all of them have been used.

III. Application:

Have students complete Skill Builder, Words to Know, alone. The Skill Builder, Working with Elderly People, should be completed as a class project.

ASSIGNMENT SHEET

Science Concept: Communication

Task: Use Principles of Psychology in Giving Patient Care

Why learn this?

A good health aide needs to possess the ability, the desire, and the eagerness to serve others. They must have the capacity to love, to care, to understand, and to be compassionate at all time.

Principle Emphasized:

Positive reinforcement has an influence on physical and emotional health

Words to Know:

Ability
Accurate
Attitude
Capacity
Care
Diagnose
Innate Needs
Love
Mental
Personality
Self-Image
Serve
Sign
Symptoms
Understand
Tact

Resources: Information Sheet - Positive Qualities for a Health Aide

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1. Read the resources.
2. Complete Skill Builder - Words to Know
3. Complete Skill Builder - Working with Elderly People

INFORMATION SHEET

POSITIVE QUALITIES FOR A HEALTH AIDE

There are several qualities a health aide should possess in order to react in a positive manner to situations they will encounter on the job.

1. Ability to get along with co-workers, employers, patients, and patients' families
2. Kind disposition
3. Tactfulness
4. Sympathy
5. Patience
6. Personality

Knowledge of the patient's personality and the individual manner in which he or she reacts to illness, anxiety, and stress is important in order for the health aide to make sound judgments.

It is essential that the health aide understand and inform the patient and the patient's family that he/she does not have the training to diagnose problems.

Observation and accurate recording of signs and symptoms are part of the responsibility of being a health aide. Knowing how to stay calm and in control when a patient has a 105 pulse rate is vital for the psychological well-being and safety of the patient. The health aide's self-confidence is vital to the patient. Let's pretend that a patient tells you he/she is having some discomfort in the abdominal area. You must not alarm the patient by saying that they are probably having an attack of appendicitis. The alternative might be to reassure the patient that often people suffer from discomfort and that you will ask the nurse to assist.

Mental attitudes of both the health aide and the patient play an important part in how both adjust to situations in which they find themselves. For example, if the health aide hates older people, he/she is not going to possess the positive mental attitude which is necessary to helping the patient to accept and cope with his/her condition. Mental health and physical health are closely related; they both affect one's outlook on life.

Hospital Research and Educational Trust, Being a Housekeeping Aide, (Bowie, Maryland: Robert J. Brady Company, 1977).

SKILL BUILDER

WORDS TO KNOW

Directions:

For each word, write the correct spelling and put the letter of the best definition in the spaces provided. Use the dictionary as your resource.

		Spelling	Definition	
1.	abelity	____________	____	a) Having the qualifications to do something
2.	acurate	____________	____	b) Sense of responsibility, watchful attention
3.	attetude	____________	____	c) Affection, strong liking, devotion
4.	capicity	____________	____	d) The way an individual sees self
5.	caer	____________	____	e) Being able to do, power to perform
6.	diegnose	____________	____	f) To perform duties, to help
7.	ennate needs	____________	____	g) Something that is observable
8.	lvoe	____________	____	h) Speaking and behaving in ways that consider another's feelings
9.	mentel	____________	____	i) Distinctive personal traits, the sum total of one's self
10.	personelity	____________	____	j) To comprehend, to know
11.	self-emage	____________	____	k) A manner of acting, feeling, or thinking that shows one's disposition
12.	sirve	____________	____	l) Analyze facts to determine a cause
13.	signe	____________	____	m) Any condition resulting from a disease or a physical disorder that is used in a diagnosis
14.	symtpom	____________	____	n) Having to do with the mind
15.	tack	____________	____	o) Inborn, natural, not learned
16.	understend	____________	____	p) Free from mistakes or errors, precise

SKILL BUILDER

WORDS TO KNOW

ANSWER KEY

1.	ability	ability	e	e) Being able to, power to perform
2.	acurate	accurate	p	p) Free from mistakes or errors, precise
3.	attetude	attitude	k	k) A manner of acting, feeling, or thinking that shows one's disposition
4.	capicity	capacity	a	a) Having the qualifications to do something
5.	caer	care	b	b) Sense of responsibility, watchful attention
6.	diegnose	diagnose	l	l) Analyze facts to determine a cause
7.	ennate needs	innate needs	o	o) Inborn, natural, not learned
8.	lvoe	love	c	c) Affection, strong liking, devotion
9.	mentel	mental	n	n) Having to do with the mind
10.	personelity	personality	i	i) Distinctive personal traits, the sum total of one's self
11.	self-emage	self-image	d	d) The way an individual sees self
12.	sirve	serve	f	f) To perform duties, to help
13.	signe	sign	g	g) Something that is observable
14.	symtpom	symptom	m	m) Any condition resulting from a disease or a physical disorder that is used in a diagnosis
15.	tack	tact	h	h) Speaking and behaving in ways that consider another's feelings
16.	understend	understand	j	j) To comprehend, to know

SKILL BUILDER

WORKING WITH ELDERLY PEOPLE

Grandparents Day

Plan a "Share with Grandparents" get-together for your class and older citizens. Students not able to invite their own grandparents may choose to invite older relatives, friends, neighbors or guests from a local senior citizens group. Provide a nutritious lunch or refreshment, and organize recreational activities. One activity to help teens and seniors learn about each other could include comparing life experiences and opinions. Key questions for the activity follow. Be sure to alert the grandparents to the questions ahead of time so that they can be prepared.

1. What was your family situation in your childhood?
2. How long did your parents live?
3. What influence did your mother or father have on your life?
4. How old were you when you took your first job?
5. Do you remember how much you were paid for your first job?
6. What did you learn on your first job?
7. What kind of work did you do most of your life?
8. How did you decide what kind of work you wanted to do?
9. How old were you when you got married?
10. How many children did you have?
11. What interests did you have in your community?
12. What did you do for recreation in your younger days and what do you pursue for recreation now in your retirement?
13. What do you enjoy most in life?
14. What would you do differently in your life if you could do it over again?

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